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Sandia National Laboratories, California Environmental Monitoring Program Annual Report March 2007



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Sandia National Laboratories, California Environmental Monitoring Program Annual Report for Calendar Year 2006

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Sandia National Laboratories, California

ABSTRACT

The annual program report provides detailed information about all aspects of the SNL/CA Environmental Monitoring Program for a given calendar year. It functions as supporting documentation to the SNL/CA Environmental Management System Program Manual. The 2006 program report describes the activities undertaken during the past year, and activities planned in future years to implement the Environmental Monitoring Program, one of six programs that supports environmental management at SNL/CA.

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Summary of Document Changes

Significant changes made to the 2007 edition of the Environmental Monitoring Program Report are marked with a sidebar within the document and summarized in Table 1.

Table 1 Summary of Significant Changes to Environmental Monitoring Program Report, 2006

Section	Page	Change
1.0	8	Added the Stormwater Industrial Activities General Permit to the requirements for environmental surveillance.
1.1.3	12-14	Updated information on BAAQMD permits and the closure of the Printed Circuit Board Facility.
1.2	17	Deleted reference to the Printed Circuit Board Facility and
All		Changed Environmental Operations Department to Environmental Management Department and Environmental Operations Technician to Environmental Management Technologist.
1.2.1	19	Added the Printed Circuit Board Facility is closed.
1.2.3	22	Added the Printed Circuit Board Facility is closed.
Table 1-6	24	Changed number of locations in Table 1-6 for groundwater and external radiation monitoring.
1.3.2	28	Updated the biological dose assessment for 2006.
1.3.3	29	Updated discussion of Stormwater Construction Activities General Permit to reflect the site is not currently under this permit.
2.2	35	Revised to reflect the Printed Circuit Board Facility is closed.
2.4	36	Added the Alameda County Health Department standards for USTs.
2.5	36	Deleted previous legal changes discussed and added the new SPCC regulations.
2.6	36	Added more detail on how the Program stays abreast of legal requirements.
Table 3-1	38	Added the Satellite Sanitary Sewer Automatic Sampler Operating Procedure
Table 4-2	40	Updated reporting dates.
5.3	43	Deleted Section 5.4 and revised Section 5.3 to remove references to associate and senior contractors and have one description for contractor(s).
Table 5-2	45	Add required classes recently identified by Department Manager.
5.6	45	Add section on specialized assignments to include UST operator required training.
6.0	46	Added current data on impervious surface and stormdrain cleaning.
Figures 6-1 to 6-4	47-49	Added current metrics' figures.
8.1	52	Deleted last year's assessment and added discussion of Sanitary Sewer Outfall and Satellite Sampling Equipment for the Self Assessment Program Area.
8.2	53	Updated with current assessment results.
8.3	54	Updated with current assessment activities and results.
9.0	54	Updated with current accomplishments.
10.1	55	Added information on draft Phase I MS4 permit that contains stormwater numerical action levels.
10.2	55	Updated with latest 303(d) list information.
10.4	56	Updated with current status.
<i>11</i>	57	Updated goals and objectives met and those identified for the next 1-3 years.

1. Program Description

DOE Orders 450.1, 5400.5, and DOE/EH-0173T, establish environmental protection program requirements, authorities, and responsibilities. These Orders stipulate that all DOE facilities comply with Federal, State, and local environmental protection laws and regulations, and best management practices. DOE Order 450.1 replaces DOE Order 5400.1, which previously required an environmental monitoring plan to document how each facility will comply with these laws and regulations. Although an environmental monitoring plan is no longer required, this report documents Sandia's efforts not only to comply with these laws and regulations but also to comply with DOE's policy to keep emissions to the environment as low as reasonably achievable (ALARA).

This *Annual Program Report* has been prepared in accordance with DOE Order 5400.5, and DOE/EH-0173T and with consideration of DOE Order 450.1. The primary purpose of this plan is to formally document SNL/California's effluent monitoring and environmental surveillance system to ensure compliance with Federal, State, and local requirements, and DOE Orders.

This report covers only operations at the SNL/California facility.

Environmental monitoring at SNL/California consists of two major parts:

1. liquid effluent monitoring, and
2. environmental surveillance.

Effluents are monitored at the point of discharge to measure the amount of pollutants released by SNL/California. Effluent monitoring data also allow SNL/California to evaluate the effectiveness of pollution control programs and to detect unplanned releases. DOE Orders 450.1 5400.5, and DOE/EH-173T contain the requirements for effluent monitoring. The City of Livermore Wastewater Discharge Permit contains additional requirements for liquid effluent monitoring.

Environmental surveillance is done to assess the actual impact of pollutant releases on portions of the environment that may be important pathways of exposure to the local population. Environmental samples also help identify trends in the pollutant levels. Surveillance data provide a means of evaluating the effectiveness of pollution control measures and of assuring that SNL/California conducts operations so as to preserve the quality of the environment. DOE/EH-0173T includes the types of environmental surveillance to be done around DOE facilities. The State of California Industrial Stormwater Activities General Permit contains additional requirements for stormwater discharge monitoring.

1.1. Site Background

1.1.1. Site Description

Location

SNL/California is approximately 65 km (40 miles) east of San Francisco, on the southeastern boundary of the City of Livermore. Figure 1-1 shows the location of SNL/California in the San Francisco Bay Area.

Figure 1-1 SNL/California in a regional setting



The SNL/California site covers 1.7 km² (410 acres, not including a 228-acre buffer zone). It lies at the western base of the Altamont hills, which form the eastern boundary of the Livermore Valley. The Livermore Valley is an irregularly shaped lowland in the Diablo Range of the California Coastal Mountain Range. It is approximately 26 km (16 miles) long (east to west) and averages about 11 km (7 miles) wide. The Valley floor slopes to the west from high elevation in the east of approximately 200m (660 ft.) to a low of about 90 m (295 ft.) at the western end of the Valley.

The Valley's major drainage is via seasonally intermittent streams (arroyos). These arroyos generally carry water to the southwest end of the Valley and into the Alameda Creek near Sunol. Alameda Creek then continues on to the San Francisco Bay.

Geology

The geology of the Livermore Valley is complex. The northern portion of the site is on gently northwest-sloping land underlain by alluvial deposits (clay, silt, sand, gravel, and similar materials deposited by running water). These deposits are mapped as Pleistocene Epoch (up to 2 to 3 million years old). Older alluvial terrace deposits and deformed beds of Livermore gravels underlie the hilly southern portion of the site. These two areas, with contrasting physiography and stratigraphy, are separated by the Las Positas fault, which extends northeast to southwest. It runs across the site along the change in slope from the hilly southern portion to the gently sloping northern portion.

The alluvial deposits create interbedded layers of higher and lower permeability overlying the older Livermore formation. The groundwater of the Livermore Valley is in the more permeable layers, which lie between 5 and 33 m (17 and 110 ft.) below the surface. Groundwater flows generally in a northwesterly direction. Groundwater flow to the south of the fault is not as well understood.

The Arroyo Seco traverses the SNL/California site from the southeast to the northwest. It receives storm water runoff from the site and acts as the primary pathway for groundwater recharge near the site.

Climatology

The climate of the Livermore Valley consists of mild, rainy winters, and warm, dry summers. The mean annual temperature is 12.5°C (55°F), with extremes ranging from 0° to 38°C (32° to 100°F). The average annual rainfall is less than 15 in., which classifies the area as semi-arid. Rain falls primarily between October and April. The wind patterns also show a strong seasonal variation. During the summer months, the winds are predominantly from the west or southwest, flowing into the Valley from the San Francisco Bay Area through the Dublin Gap at its western end. The winds typically exit the Valley through the Altamont Pass at the eastern end. Peak winds tend to occur during the afternoon due to the "sea-breeze" effect caused by the high air temperatures in the inland valleys compared to the cooler air over the Pacific Ocean. Periods of calm occur most often during the early morning hours just before dawn. During the winter months, winds tend to blow predominantly from the south, with a secondary component from the north. Relative humidity ranges from daily lows of 40-60% in the afternoons to daily highs of 80% to over 90% in the early morning.

1.1.2. Land Use

Figure 1-2 is an aerial photograph of the SNL/California site and vicinity, showing the predominant land uses.

The SNL/California site is immediately bounded on the east, south, and west by a security buffer zone. No development is allowed in this zone, and public access is not permitted.

LLNL lies directly to the north of SNL/California. Patterson Pass Road is the northern boundary of the LLNL site. Across Patterson Pass Road to the north is a light industrial park. A Union Pacific Railroad line runs east to west along the northern boundary of the industrial park. Land uses further north include vacant land, industrial, a Southern Pacific Railroad line, and Interstate 580 (I-580). Land northeast of the site is agricultural used primarily for grazing. Wind turbines are on the hills of the Altamont Pass further northeast of the site.

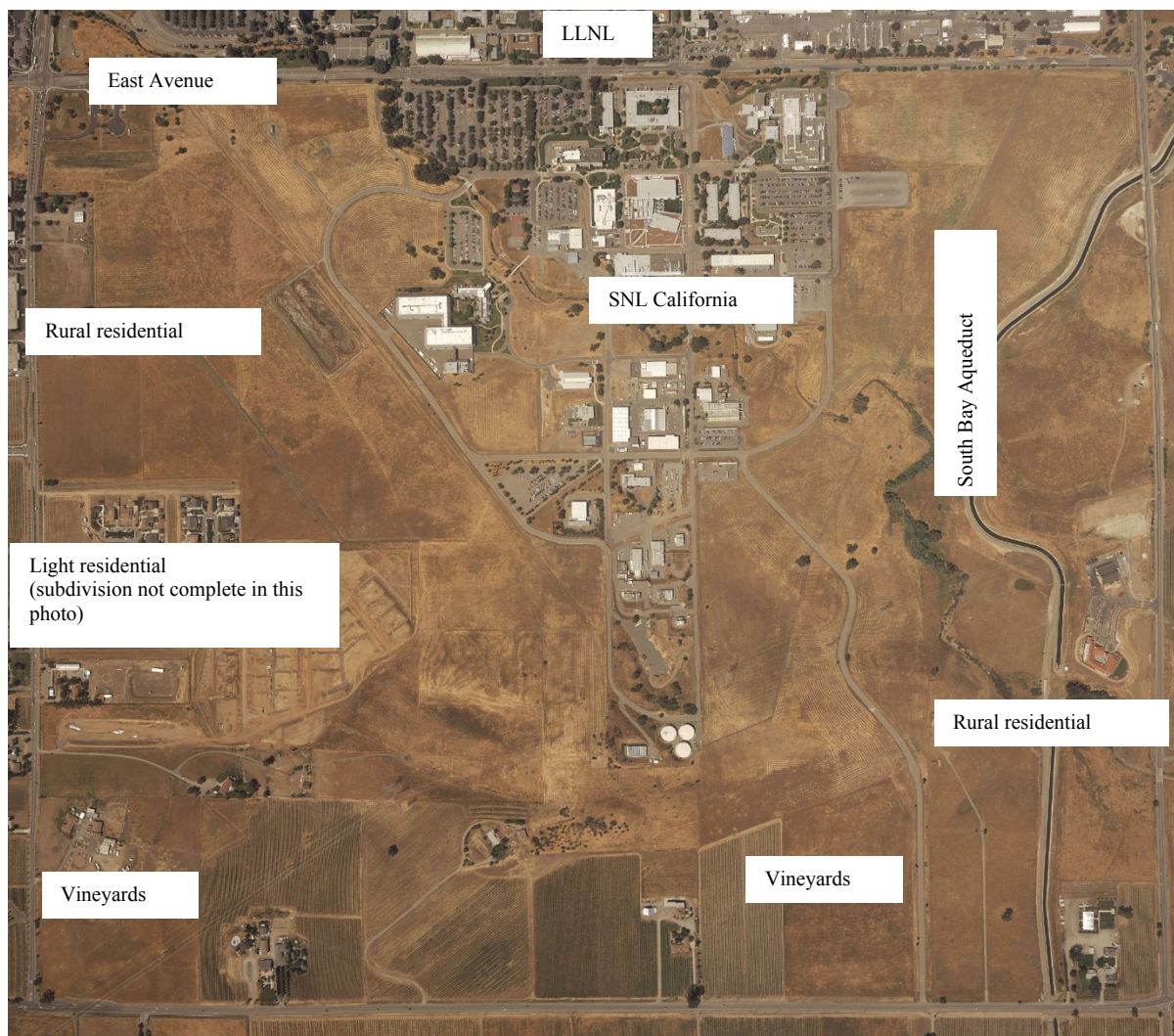
The SNL/California site is bordered on the east by private property and Greenville Road. The property east of Greenville Road is mainly agricultural, used primarily for grazing and vineyards, with a few scattered rural residences. A Western Area Power Administration electrical substation is on the southeast corner of Greenville Road and Patterson Pass Road. The South Bay Aqueduct, a branch of the California Aqueduct, traverses the land east of the SNL site from north to south and runs parallel to SNL/California's eastern boundary. The Patterson Reservoir and filtration plant for the South Bay Aqueduct are northeast of the SNL/California site along Patterson Pass Road.

Tesla Road borders the southern portion of the SNL/California site. Approximately 50 acres south of the SNL/California site border (between the border and Tesla Road) are vineyards. Agricultural lands south of Tesla Road and west of Greenville Road are also vineyards.

The SNL/California site is bordered on the west by private property and Vasco Road. A residential development is west of SNL/California, east of Vasco Road, and south of East Avenue. A low-density, single-family residential subdivision is on the southwest corners of Patterson Pass Road and Vasco Road. Residential housing developments are located west of Vasco Road on the north and south sides of East Avenue. A light industrial park is on the southwest corner of East Avenue and Vasco Road. Other lands to the west are rural residential and agricultural (primarily vineyards).

Several easements for utilities cross the SNL/California site. PG&E has easements for overhead high-voltage electric power transmission lines and an underground high-pressure gas line. Standard Oil Company of California has an easement for an underground oil line.

Figure 1-2 Predominant land uses around the SNL/California site



1.1.3. Operational Activities

SNL/California's engineering, research and development work requires the use of small quantities of hazardous and radioactive materials. These materials are present only in small laboratory-scale quantities. Table 1-1 lists SNL/California's facilities by building number, their description and use, and size (square footage). The following are SNL/California's activities that could release pollutants to the environment:

1. *Space Heating*-SNL/California has ten boilers on-site for providing space heating. All of the boilers are fired by natural gas. Given the size of the boilers and one source of fuel they are exempt from BAAQMD permitting.
2. *Degreasers*-SNL/California operates one equipment degreaser that uses a regulated cleaner. The BAAQMD has issued a permit for this degreaser. This permit is updated and reissued annually.

Table 1-1 SNL/California Facilities

Bldg. #	Description/Use	Sq. Ft.	Bldg. #	Description/Use	Sq. Ft.
904	Auditorium	5,082	968	CRDL	16,017
905	Combustion Research Facility (CRF) Offices	37,778	969	CRDL Mechanical Assembly	2,672
906	CRF Labs	76,369	970	Energy Conversion Laboratory	2,408
907	Mechanical Building	4,501	972	Centrifuge and Laboratories	11,028
910	Weapons Laboratory Building	88,886	973	Firing, Support Labs, and Offices	5,634
911	Personnel, Purchasing	20,621	973-1	Storage	295
912	Offices, Services, Computer Center	128,103	974	Explosive Assembly	955
914	NDE, Applied Mechanics Laboratories	25,023	976	Gas Applications and Systems Facility	3,539
915	DISL, offices	71,500	977	Storage and Laboratory	1,460
915-1	Emergency Generator Room	504	978	Explosive Test Facility	3,334
916	Laboratories, Offices	41,768	978-1	Storage Shed	204
916-1	Mechanical Equipment Building	3,420	979	Component Development Laboratory	4,729
916-3	Equipment Room	440	982	Explosives Packaging Storage	258
919	Electrical Substation	2,012	982-6	Storage	800
920	Offices	12,273	983	FTU Assembly	1,621
921	Offices and Library (scheduled for demolition)	12,339	M22	Education Television Center	2,188
922	Offices	12,339	M23	Diversity and Development, Offices	2,250
923	Records Storage	3,915	M24	Offices	3,363
925	Medical	5,419	M25	Education Outreach, Offices	2,877
927	Warehouse	22,001	M28	Instrument Issue and Repair	1,456
928	Shipping, Receiving, Stores	27,859	M29	Offices	1,473
929	Program Development Facility	22,000	M30	Training Classroom	1,459
940	Manufacturing and Nano Technology Laboratories (MANTL) Offices	22,789	M32	Life Design Center/Physical Therapy	2,880
941	MANTL	30,219	M44	Facility Turn Around Space	1,440
942	MANTL	25,740	M45	General Office	1,440
943	MANTL	7,200	M46	Escort Office	720
955	Environmental Test Facility	6,458	M47	Restrooms	620
956	Dynamic Test Facility	2,572	M50	Offices	6,480
960	Facilities Office	12,155	M51	Offices	9,360
961	Radiation Decontamination and Storage Facility	3,779	M52	New Hire/8900 Office	10,080
961-1	Hazardous Material Processing	8,422			
962	Maintenance Landscape Shop	784			
962-1	Maintenance Shed	320			
962-2	Maintenance Shed	616			
962-3	Storage	598			
962-4	Maintenance Shed	96			
962-5	Maintenance Shed	96			
962-6	Storage	426			
962-7	Storage	400			
963	Maintenance Shops	14,546			
963-1	Maintenance Warehouse	18,000			
963-2	Welding Shop	1,384			
963-3	Warehouse/Tool Crib	12,250			
963-5	Landscape Shop	514			
964	Security Building	11,840			
965	Laboratory	1,205			
966	High Pressure Test Facility	7,926			
967	Chemical and Radiation Detection Laboratory (CRDL) Office	4,771			
				Total	103,040

3. *Paint Spray Booth*- SNL/California operates one paint spray booth, which has been permitted by the BAAQMD. This permit is updated and reissued annually.
4. *Waste Storage Facility*-The Hazardous Waste Treatment and Storage Facility used for storing containerized and drummed wastes consist of two buildings 961 and 9611. Both structures are completely enclosed. They are made of prefabricated, pre-engineered steel frame with a monolithic concrete floor and metal roof. The floor is coated with a chemical resistant epoxy coating. Building 9611 also has a covered loading dock on the south side. The dock has a secondary containment trough if a spill during loading operations should occur on the west side. Waste is not stored on the dock. Since the facility is now completely under roof the requirement for containment of precipitation from a 24-25 year storm does not apply.
5. *Printed Circuit Board Facility*- Laboratory operations ceased as of February 2006. This laboratory is closed and no longer in operation. The Printed Circuit Board Facility in Building 910 contained dip and rinse tanks containing the following materials: copper, cadmium, lead, ammonia, and volatile organics. Effluents from this laboratory were directed to a process water tank. The effluent was treated by ion exchange to remove metals such as copper and, if necessary, the pH is adjusted. The effluent was analyzed for copper and pH before being released to a Liquid Effluent Control System (LECS). The contents of the LECS were analyzed for compliance with Livermore Water Reclamation Plant (LWRP) discharge limits before they were released to the sanitary sewer. In addition, effluents from this laboratory were analyzed biannually under the requirements of the Federal Categorical Pretreatment Regulations. The LWRP also independently sampled and analyzed the effluents from these processes.
6. *Electroplating Laboratory*- The Building 943 laboratory liquid effluent is treated in a closed-loop system and reused as makeup water. The BAAQMD has issued a permit for the process in this facility. The permit requires records of ampere-hours be maintained monthly. However, the equipment is currently not in operation. Nevertheless, the permit and exemption is still updated and reissued annually. SNL/CA maintains a BAAQMD operating permit (monitoring and limiting air emissions) for chromium plating operations, and renews it annually. However, this permitted process has not operated for over a decade and there are no planned future operations.
7. *Explosives Testing*-Small-scale testing of explosive devices is conducted in enclosed test cells. These permitted and exempt sources have been archived with the BAAQMD and are no longer on the SNL/CA Permit to Operate.
8. *Radiography*-Isotopic gamma ray sources (^{60}Co and ^{192}Ir) and x-ray-producing machines are used in the 941 complex. The external dose rates in and around the building were studied and were determined to slightly exceed background levels during operations. These operations do not release radioactive materials to the environment.
9. *Combustion Research Facility*-This facility houses research-scale studies of combustion processes, including research on internal combustion engines. The laboratories and processes in this facility are typically exempt from permitting due to their small scale research applications. As changes to laboratories, processes or materials occur, emissions evaluations are performed to verify that exemptions are still applicable.
10. *Maintenance Shop*-This shop maintains and repairs mechanical equipment for all SNL/California organizations. These operations entail the use of various solvents and other chemicals that may be subject to environmental regulations.

11. *Model Shop/Test Assembly*-This shop fabricates and assembles components for research and experiments. These operations may involve the use of radioactive or hazardous materials.
12. *Experimental Laboratories*-Various small, research-scale laboratories use a wide range of chemicals or hazardous substances. Airborne and liquid emissions have been evaluated and controlled as necessary. Appropriate permits or written exemptions have been obtained for these laboratories.
13. *Semiconductor Manufacturing Laboratory*-The Semiconductor Manufacturing Laboratory in Building 968 conducts the following operations: polishing, etching, cleaning of film, lithography, and film deposition. These operations use acids, caustics, and solvents. Effluent from this laboratory is directed to a treatment unit where the pH is neutralized. Prior to release to the sanitary sewer, the effluent in the LECS is analyzed to determine if it is in compliance with LWRP discharge limits. In addition, effluent from the laboratory is analyzed biannually under the requirements of the Federal Categorical pretreatment Regulation. LWRP also independently samples and analyzes the effluent from these processes.

1.1.4. Known Areas of Contamination

Several areas at the SNL/California site have been investigated to determine if environmental contamination was present. One contaminated site has been remediated and formally closed. The following discussion covers those areas where environmental contamination exists.

Fuel Oil Spill Site (FOS)

In 1975, as the result of an accidental puncture of an underground transfer line, 59,500 gallons of #2 diesel fuel spilled into the vadose zone from an aboveground reserve fuel tank.

SNL/California completed a remedial investigation of the spill site in November 1988. In-situ bioremediation was determined to be the technology of choice for clean up of the FOS.

During installation of the bioremediation facility, an interim remedial measure was implemented. This interim measure consisted of capture of groundwater and treatment with activated carbon.

The bioremediation facility operated from June 1995 through July 1999. Data collected during this time period indicated that the diesel plume was not migrating, and that natural degradation of the diesel would be sufficient to prevent negative impacts from the plume. The Regional Water Quality Control Board (RWQCB) allowed SNL/California to dismantle the bioremediation facility.

SNL/California is required to monitor two wells at the FOS semi-annually. Periodically, the Regional Water Quality Control Board may review the data, and decide if further action is required.

Navy Landfill

An inactive landfill is located at the southern end of the SNL/California site. It was used by the Navy during and shortly after World War II, and again by LLNL in the 1950s and early 1960s. A survey of historical records and landfill contents indicated that only general construction debris and machine turnings were disposed of at the site. There is no indication that hazardous materials

were buried at this landfill. The landfill measures approximately 11,300 m² in area and 68,800 m³ in volume.

SNL/California investigated this site from 1988 through 1998.

In October of 1997, a risk assessment and closure plan were submitted to the Regional Water Quality Control Board. The closure request was approved in March 1998. Closure of the NLF was approved if the following conditions were satisfied:

1. Groundwater monitoring is continued on a quarterly basis at monitoring well NLF-6, where carbon tetrachloride is intermittently detected.
2. An adequate vegetative cover is applied to the landfill, such that there are no exposed areas.
3. Erosion control measures are followed in accordance with the submitted erosion control plan.

All NLF site closure activities were completed on July 9, 1998, and the site is considered closed as of that date. All of the Regional Water Quality Control Board closure conditions have been satisfied. SNL/California will continue to monitor NLF-6 and to follow the site's erosion control plan. Continued inspections of the NLF site have shown no evidence of erosion. During 2005, SNL/CA and DOE/SSO will submit a request to the RWQCB to approve discontinuation of stormwater sampling at this location.

SNL/CA was required to continue quarterly monitoring of carbon tetrachloride at well NLF-6 until four continuous quarters of non-detectable concentrations was achieved. This was achieved during the first quarter of 2005. A request to rescind Cleanup and Abatement Order 89-184 was made to the RWQCB on April 18, 2005. In August 2005 the RWQCB approved decreasing monitoring at NLF-6 from quarterly to annually.

Trudell Auto Repair Shop

The Trudell Auto Repair Shop site is located in the Buffer Zone area on the northwest corner of the site. Hydrologic investigations at the Trudell site identified areas of soil pollution in localized areas of the site, and in two areas where waste oil was disposed of to land. All remedial actions were completed by August 1990. Since the area of contamination at Trudell was small, no monitoring wells were drilled by SNL/CA. However, LLNL has three wells at or near the Trudell site; previously SNL/CA sampled one of these wells (MW-406). This well was also sampled for groundwater down gradient perimeter monitoring. In early 2005, the RWQCB allowed SNL/CA to discontinue monitoring this well. LLNL continues to monitor this well and at the RWQCB's request SNL/CA will report these monitoring results in the Annual Site Environmental Report.

Solvent Plume from LLNL

The plume of TCE contaminated groundwater underlying LLNL property extends onto SNL/California property. The source of the TCE was from past practices at LLNL. LLNL is treating groundwater to remove the TCE. SNL/California has no responsibilities in this area. SNL/CA has discontinued monitoring MW-406 annually but will continue to review LLNL monitoring results until tetrachloroethene (perchloroethene or PCE) is non detectable.

1.2. Effluent Monitoring

Effluents are monitored to demonstrate SNL/California's compliance with applicable Federal, State, and local laws, regulations, and orders. Monitoring is done through quantification of pollutant emissions at the points of discharge from facilities.

Data from effluent monitoring equipment are used to assess compliance with standards for pollutant emissions.

SNL/California is committed to conduct operations so that emissions of hazardous materials to the environment are in compliance with all applicable regulations. Moreover, Sandia strives to keep emissions to ALARA levels.

SNL/California monitors two types of effluents: process wastewater and the sanitary sewer effluent (where it leaves the site and joins the sanitary sewer effluent from LLNL).

SNL/California does not have any radiological or non-radiological emissions that require air monitoring.

Since the cleanup of the former Tritium Research Laboratory and its transition to non-nuclear uses, SNL/California no longer models doses to the public from airborne effluents. However, SNL/California personnel do retain the capability to perform such modeling should the need arise in the future.

SNL/California has established the following policy for wastewater discharges:

- *Any wastewater discharged either directly to the site sanitary sewer system or to a LECS shall not have pollutant concentrations exceeding the site outfall discharge limits imposed by the City of Livermore.*
- *Wastewater effluents from categorical processes must comply with Federal Pretreatment Standards.*
- *Routine discharges from the LECS to the site sewer system must also comply with site outfall discharge limits. If LECS wastewaters inadvertently exceed these concentrations, but are below hazardous waste concentrations, the effluent may or may not be treated or shipped off-site for treatment or disposal at the discretion of the Environmental Management Department. If the effluent exceeds hazardous waste concentrations, it shall be shipped off site as a hazardous waste.*

Long-standing Sandia policy prohibits hazardous waste disposal down sanitary sewer connections.

DOE/EH-01733T and Section 13.32 of the city of Livermore Municipal Code outline the monitoring requirements for process wastewater and sanitary sewer effluents. These requirements are also included in the Wastewater Discharge Permit #1251. Table 1-2 lists the site sanitary sewer outfall discharge limits for specific pollutants.

Table 1-2 Specific Pollutant Limitations

Pollutant	Concentration Limit^a
Arsenic	0.06 mg/l ^b
Cadmium	0.14 mg/l
Copper	1.0 mg/l
Chromium (Total)	0.62 mg/l
Lead	0.20 mg/l
Mercury	0.01 mg/l
Nickel	0.61 mg/l
Silver	0.20 mg/l
Zinc	3.00 mg/l
Cyanide	0.04 mg/l
TTOC ^c	1.0 mg/l
pH	5-10

^aThese limits are specified in Section 13.32.100 of the City of Livermore Municipal Code and have been adopted by SNL/California as internal operating limits.

^b1 mg/l is equivalent to 1 ppm (parts per millions).

^cTTO = Total Toxic Organics

1.2.1. Liquid Effluent Control Systems

Liquid effluents from the major wastewater-generating operations on-site are routed to the site's liquid effluent control systems (LECS). LECS are not required by any regulations, but SNL/California has established them to provide better control of liquid effluents and to ensure compliance with regulatory discharge limits and sound management practices.

The LECS comprise large doubly-contained, level and pH-monitored, holding tanks. These tanks collect and retain the wastewater, allowing a sample to be analyzed for process constituents. (If a tank contains pollutants at levels greater than regulated permit limits, then the liquid is treated or disposed of as hazardous waste, as described in the policy statement above.)

The Environmental Management Department is responsible for managing all aspects of the LECS, including collecting and analyzing samples, disposing of wastewater, and keeping records.

Figure 1-3 shows the locations of the LECSs at the SNL/California site. They are:

- *Bldg. 906* – process wastewater is routed to a LECS consisting of two 6,000-gallon tanks (new tanks installed in 2005).

- *Bldg. 910* – process wastewater is routed from the Printed Wiring Facility to a LECS consisting of one 5,000-gallon tank. This LECS facility was closed in 2006 after the Printed Wiring Facility ceased discharges and closed.
- *Bldg. 916* – process wastewater from laboratories in Bldg. 916 is routed to a LECS consisting of three 5,000-gallon tanks.
- *Bldg. 941* – process wastewater is routed to a LECS consisting of two 5,000-gallon tanks (new tanks installed in 2005).
- *Bldg. 961* – water from decontamination operations is routed to a LECS, consisting of one 2,000-gallon tank.
- *Bldg. 968* – all floor drains and laboratory sinks are routed to four 2,000-gallon tanks (new tanks installed in 2005).

When the liquid level in a tank reaches a pre-determined level, the tank is isolated and a sample is collected and analyzed. The tank does not receive any more wastewater before its contents are properly disposed.

To assure that a representative sample is collected, the contents of the tanks are agitated by recirculation, stirring, or by air being bubbled through them before they are sampled.

A State-certified contract laboratory analyzes all LECS samples. If needed, LECS tanks can be sampled and analyzed in the field for copper and zinc using a VVR Water Analysis System at the discretion of the program lead. The 906, 916, 941, and 968 LECS are continuously monitored for pH and liquid level. The 961 LECS receives only batch discharges; thus continuous level monitoring is not implemented here.

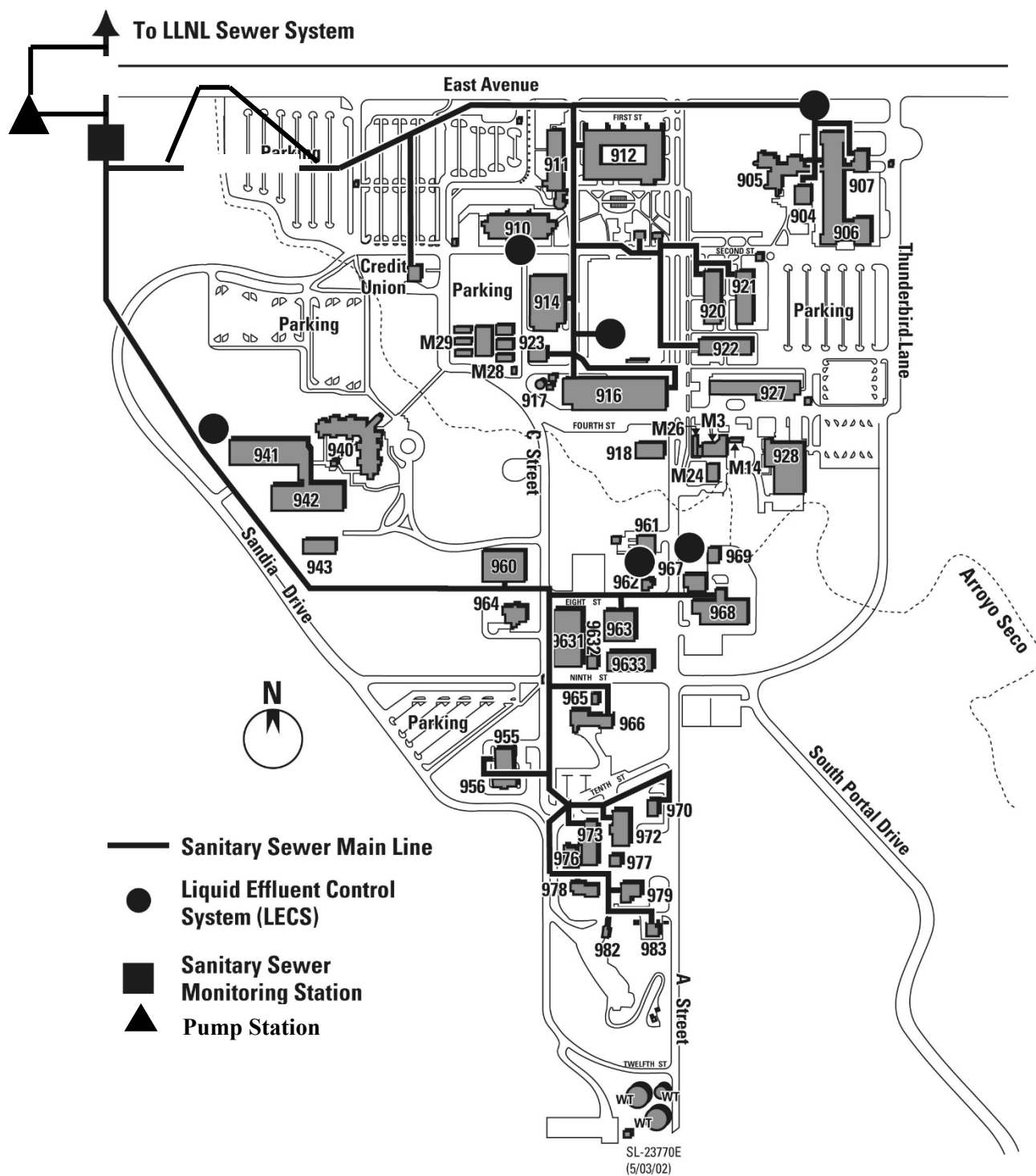
The analyses done on each LECS are based on the process generating the wastewater (see Table 1-3). The primary constituents of concern are metals. Procedures for collecting and analyzing samples from the LECS have been developed and implemented. The procedures also address quality assurance and control issues.

Table 1-3 LECS Wastewater Analyses

LECS	Analyses
B. 906	As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn
B. 910 ^a	As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn
B. 916	As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn
B. 941	As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn
B. 961	As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn, 238U, volatiles, semivolatiles, CN ⁻
B. 968	As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn

^a The 910 LECS was closed in 2006 after all laboratory operations ceased discharge.

Figure 1-3 SNL/California sanitary sewer system and locations of the liquid effluent control system



1.2.2. Sanitary Sewer

SNL/California monitors its sanitary sewer effluent before it exits the site and joins the sanitary sewer flow from LLNL.

To provide a final check on the quality of the effluent flow, SNL/California continuously monitors, and collects samples of the effluent (see Table 1-4 for the analyses performed on the samples). This way, SNL can verify compliance with discharge limits.

Table 1-4 Sanitary Sewer Sampling Type and Frequency

Frequency	Type	Parameter	EPA Method
monthly	grab	cyanide	335.2
monthly	grab	semi-volatile organics	625
monthly	grab	volatile organics	624
monthly	grab	chlorinated pesticides	608
weekly	weekly composite	metals	200.7, 206.2, 239.2, 245.1
monthly	daily composite	TDS, TSS, BOD	150.1, 160.1, 160.2

In addition, the combined effluent at the LLNL sewer outfall is monitored extensively, to include continuous monitoring for metals, pH, flow, and gamma radiation. This monitoring is supplemented by flow proportional grab samples, which are analyzed daily for gross alpha activity and gross beta activity. These composite grab samples are also analyzed monthly for metals, organics, TDS, TSS, specific conductivity, BOD, COD, and CN.

Daily grab samples from the Livermore Water Reclamation Plant effluent are also analyzed for gross alpha activity, gross beta activity, and tritium.

Sanitary sewer effluent samples are collected at the site sewer outfall approximately 400m northwest of the Building 941 complex (see Fig. 1-3).

The City of Livermore Wastewater Discharge Permit contains pollutant limits based on applicable Federal and State regulations. Title 17 CCR contains discharge limitations for radionuclides.

Continuous monitoring of flow and pH is done at the outfall. Flow is measured by a Poly-Level model ER586-F flowmeter. The pH probe is a Horiba model.

Monthly grab samples are collected manually at the outfall, upstream of the flow-measuring instrument. Continuous flow-proportional samples are collected with an ISCO 3700R refrigerated sampler. Table 1-4 shows the collection frequency of the various types of samples. A second flow proportional sampler collects daily composite samples, which is archived until results from the original sample have been received. Monthly grab samples are collected for cyanide, semi-volatile organics, and volatile organics (the organics results are compared to the TTO effluent limitation). Flow-proportional daily composites are collected monthly for TDS,

TSS, and BOD. Flow-proportional weekly composites are collected for metals. A State-certified contract laboratory does these analyses.

Quality Assurance/Quality control duplicate samples are collected for all parameters on a monthly basis.

1.2.3. Federal Categorical Processes

SNL, California has three processes, which are subject to the regulation under the Federal Categorical Pretreatment Standards. The regulations for the Federal Categorical Pretreatment Standards applicable to SNL/California operations are found in 40 CFR parts 403, 433, and 469.

SNL/California operates two metal finishing categorical process subject to the EPA's pretreatment standards for point sources. The processes are the Electroplating Facility in Building 943 and the Fiber Amplifier Laboratory in Building 906 Room 115A. These processes do not discharge to the sanitary sewer, and therefore, are exempt from sampling. The Printed Wiring Facility, located in Building 910, was formerly regulated as a metal finishing categorical process but the facility ceased operation in 2006 and is closed. SNL/California operates one semi-conductor categorical process, the Microstructures Laboratory in Building 968 Room 120, subject to the EPA's pretreatment standards for point sources.

Semiannually, SNL/California conducts special sampling procedures for the facility's wastewater. The compliance point for categorical processes is at the end of the process, not at the site outfall. To comply with the requirements of the Federal Pretreatment Standards and the City of Livermore Wastewater Treatment Plant wastewater permit, SNL/California collects grab samples of the wastewater from the Microstructures Laboratory semiannually. A State-certified commercial laboratory analyzes the samples for pH, arsenic and total toxic organics (TTO).

1.3. Environmental Surveillance

The primary task of the Environmental Monitoring Program is to monitor the major potential pollutant release pathways from the SNL/California site. Environmental surveillance samples also provide a means of verifying the effectiveness of environmental controls (at the source). They provide valuable data for determining SNL/California's compliance with applicable environmental regulations.

The Environmental Monitoring Program also provides surveillance for detecting and quantifying unplanned releases (e.g., in case of an accident).

SNL/California monitors external radiation and liquid effluents. Table 1-5 shows the DOE's minimum criteria for determining a need for environmental surveillance. Even though this table deals primarily with radionuclide monitoring, SNL/CA uses these criteria to show that specific radionuclide monitoring is not justified at SNL/CA. Table 1-6 summarizes SNL/California's environmental surveillance activities. State and local authorities also require SNL/California to perform environmental surveillance, as reflected in Table 1-6.

Table 1-5 Minimum Criteria for Determining Need for Environmental Surveillance

Topic	Criteria
Routine surveillance of all pathways (ingestion, inhalation, and immersion and submersion doses)	When feasible, all environmental media that, as determined by site-specific radiation exposure pathway analysis, might lead to a measurable annual dose of site origin at the site boundary should be routinely sampled and analyzed (for the critical radionuclides to dose) and routine measurements of penetrating radiation should be performed at those sites that, as determined by site-specific exposure pathway analysis, might result in an annual dose of site origin at the site boundary, if the total exceeds a) 5 mrem effective dose equivalent; or b) 100 person-rem collective effective dose equivalent within a radius of 80 km of a central point in the site.
Periodic confirmation	Environmental surveillance measurements may be performed periodically, but should be performed at least every five years, to confirm the low dose levels, if the projected annual effective dose equivalent of site origin is less than 0.1 mrem. The frequency and magnitude of environmental surveillance should be proportional to the potential annual dose. Where potential annual dose represents a significant fraction of the reference dose for routine surveillance, environmental sampling should be more frequent. At 20% of the reference dose (e.g., 1 mrem effective dose equivalent from emissions during a year), annual surveillance for confirmation should be considered.
Pathway measurements	Actual measurements on two media for each critical radionuclide/pathway combination, one of which might be the effluent stream, should be performed as part of the site routine effluent monitoring and environmental surveillance program.
Use of control data	Use of data should be based on statistically significant differences between the point of measurement and background (or control) data.
Unplanned releases	Provisions should be made, as appropriate, for the detection and quantification of unplanned releases of radionuclides to the environment.

Table 1-6 Environmental Monitoring Sampling Program

Media	No. of Locations	Parameters	Frequency	Requiring Authority	Authority Reported to
Groundwater	7	tritium, metals, solvents, pesticides, minerals, diesel	quarterly, bi-annual, annual and semi-annual	DOE Order 231.1	DOE, RWQCB
Sewer	1	metals, pH, TSS, priority pollutants, cyanide, BOD, COD, TDS	continuously, weekly, monthly	DOE Order 231.1, City of Livermore	DOE, City of Livermore
Stormwater	10	tritium, pH, TSS, oil and grease, cyanide, metals, COD, specific conductance, ammonia and nitrate/nitrite	two storms per year	DOE Order 231.1, State of California General Industrial Permit	DOE, State of California (RWQCB)
External radiation	4	dose	monitored continuously, analyzed quarterly	DOE Order 231.1	DOE

1.3.1. External Radiation

The public may be exposed to external radiation from nuclear facility operations. Pathways include cloud passage of airborne effluents; previously released and deposited radionuclides on soil, vegetation, or sediments; radiation-generating facilities, especially high-energy accelerators or industrial x-ray equipment and large isotopic radiation sources; and the storage or movement of radioactive waste.

The only sources of external radiation at the SNL/California site are large isotopic radiation sources used for industrial radiography operations. Thermoluminescent dosimeters (TLDs) are used to measure the dose rates near SNL/California. Dosimeters are located at the site perimeter and more distant locations near the California site. Presumably, if the Laboratory were contributing significantly to the external radiation doses, the dosimeters at the site perimeter would show a higher dose than those at more distant locations.

DOE/EH 0173T contains guidance on external radiation monitoring methods (see Table 1-5). Additional guidance on external radiation monitoring may be found in the U.S. Nuclear Regulatory Commission's (NRC's) Regulatory Guide 4.13 and ANSI-N545-1975.

SNL/California maintains four on-site TLDs (Fig. 1-4). Figure 1-4 also shows the near-field TLD locations (maintained by LLNL), and Figure 1-5 shows the distant TLD locations (also maintained by LLNL).

The TLDs used on-site at SNL/California are Harshaw Model 8807. Environmental Management Department personnel collect them quarterly and send them to SNL/New Mexico, for analysis by the Health Instrumentation Division. In the field, the TLDs are put in plastic vials, which are placed in waterproof, light sealed containers at the sampling location.

The off-site TLDs are collected quarterly by LLNL's Environmental Monitoring Group and are processed by LLNL's Hazards Control Division. They are kept in mylar bags while in the field. The sampling locations have been chosen to avoid interference from large or massive objects nearby.

Each phosphor of LLNL's TLD must read within $\pm 5\%$ of the other three phosphors upon calibration to be acceptable for placement in the field. Dosimeters with a known exposure are introduced as blind samples during processing of the field dosimeters. These are equivalent to spiked pseudosamples for the purpose of establishing the accuracy of the system.

Duplicate dosimeter packets are placed at random locations and are analyzed with the routine dosimeters. The dosimeters are calibrated using NIST-traceable standards. Potential doses to the TLDs during collection and transit are assessed by the use of transit or trip controls.

Figure 1-4 Near-field thermoluminescent dosimeters (external radiation monitoring)

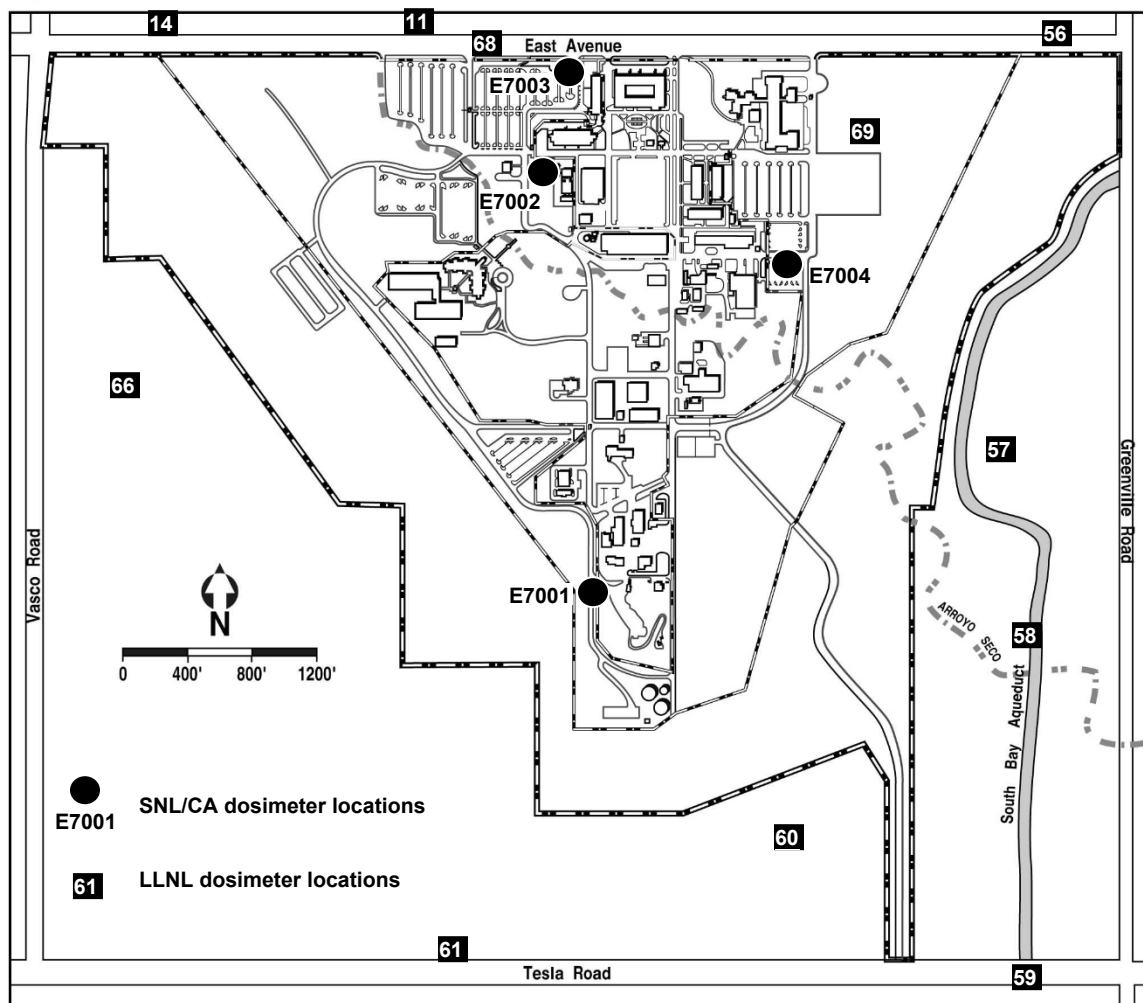
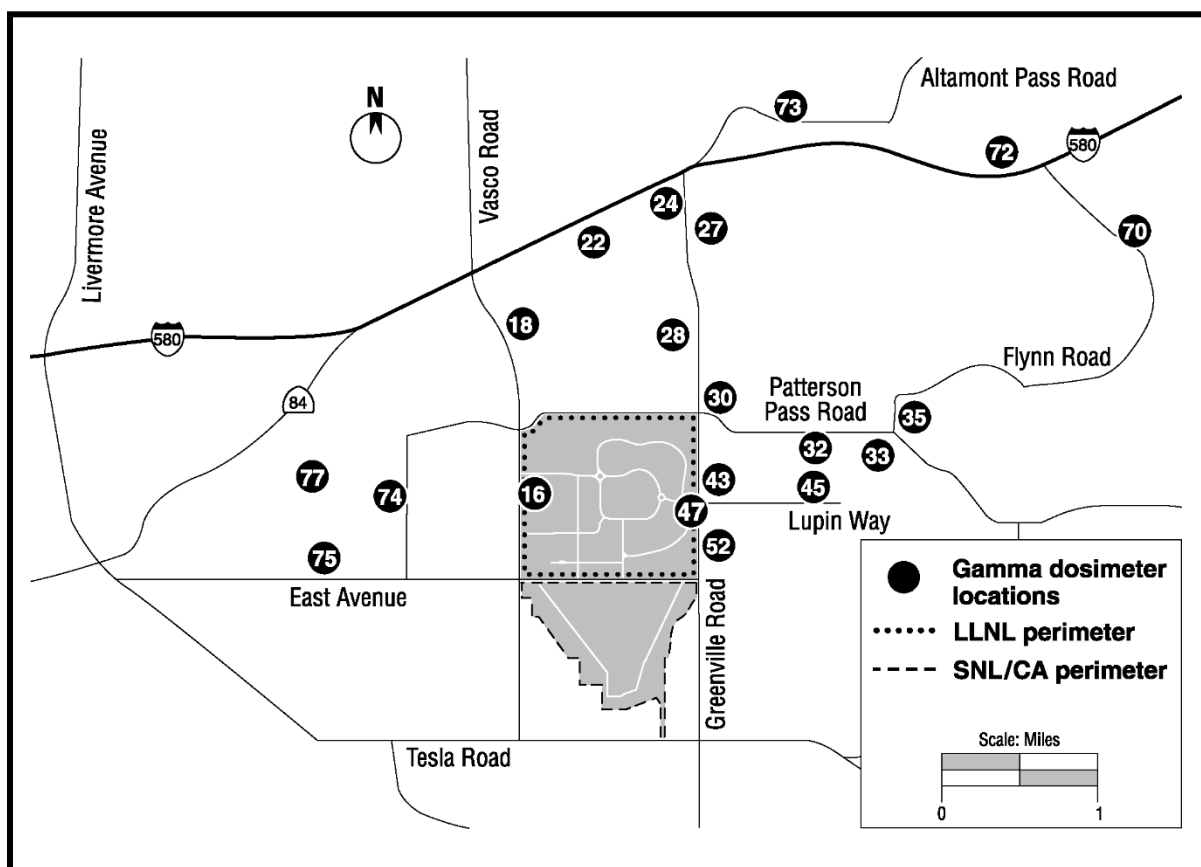


Figure 1-5 Locations of distant thermoluminescent dosimeters (external radiation monitoring)



1.3.2. Biological Dose Assessment

In accordance with DOE Orders 5400.5 and 450.1, SNL/CA performs a biological dose assessment (BDA) annually. This assessment is performed utilizing DOE's graded approach as presented in DOE Standard 1153-2002 "A Graded Approach for Evaluating Doses to Aquatic and Terrestrial Biota."

The technical standard includes spreadsheets that include models for calculating doses from sediment and water radionuclide concentration data. The first step in the graded approach is a general screening which compares concentrations of radionuclides in environmental media with derived concentration guides. The ratios of the concentrations to the concentration guides are then summed. If the total equals or exceeds unity, then further analyses are required.

The radionuclides handled in greatest quantity at SNL, California during present or past operations are tritium and depleted uranium. Tritium in stormwater runoff was the only radiological data available for SNL/CA. LLNL collects sediment samples in the Arroyo Seco near the exit from the SNL/CA site during some years. When available, data from co-located

samples of stormwater runoff and sediment collected from the Arroyo Seco where it exits the SNL, California site are input into the spreadsheet. The sum of fractions from water totaled 1.89×10^{-6} for 2006. This small fraction indicates that further analysis is not required.

LLNL did not collect uranium data in Arroyo Seco Sediments during 2005, so this data was not included in the BDA.

1.3.3. Storm Water Runoff

Storm water may pick up various pollutants, such as oil and grease, soil, litter, pesticides and fertilizer, as it runs off rooftops, material handling areas, parking lots, and other impervious areas on-site. The SNL/California site has a storm drain system that transports surface runoff to the Arroyo Seco directly or via a ditch along East Avenue. Generally, any flow in the Arroyo Seco during wet months discharges into Alameda Creek, which eventually flows into San Francisco Bay. During dry months, any non-storm water discharge would eventually evaporate before reaching the Bay; however, pollutants may still be transported to San Francisco Bay when the Arroyo Seco flows again.

SNL/California is governed by California's General Industrial Activities Storm Water NPDES General Permit (general industrial storm water permit). This permit regulates storm water discharges from "industrial activities" (as defined by the EPA's Phase I November 1990 regulations). It requires that SNL/California do the following:

- effectively eliminate non-storm water discharges,
- prepare and implement a Storm Water Pollution Prevention Plan (SWPPP),
- develop and conduct a Storm Water Monitoring Program.

In response to the permitting requirement of the Federal Clean Water Act for municipal storm water discharge, the City of Livermore and Alameda County Flood Control & Water Conservation District adopted ordinances that also require SNL/California to manage storm water discharges to the municipal storm drainage system. However, under a memorandum of understanding with the Regional Water Quality Control Board (RWQCB), the RWQCB is the lead regulatory agency for federal facilities such as SNL/California.

SNL/CA has prepared and maintains a Storm Water Pollution Prevention Plan that identifies activities that result in non-storm water discharges to the storm drain system and describes how these discharges are eliminated. It identifies sources and activities that could allow pollutants to be deposited on impervious surface and picked up by storm water runoff. It also describes how SNL/California minimizes these pollutant sources discharged with storm water runoff by implementing best management practices.

The purpose of the Storm Water Monitoring Program is to optimize SNL/California storm water pollution prevention activities. It consists of extensive visual inspection and sampling activities, which include:

- quarterly visual inspection for non-storm water discharges,
- wet weather visual inspection,
- storm water sampling, and

- annual site inspection.

Storm water monitoring information is used to identify potential sources of pollutants and non-storm water discharges.

SNL/CA prepares an “Annual Report for Stormwater Discharges Associated With Industrial Activities.” This report is submitted to the State Water Resources Control Board and details the results of the stormwater monitoring program for the year, including the inspections listed above, corrective actions taken, and the stormwater analyses.

If construction activities onsite disturb one acre or more SNL/California must file a Notice of Intent (NOI) to be covered under California’s General Permit for Storm Water Discharges Associated with Construction Activities (general construction storm water permit). The site currently does not require coverage under the Construction Activities General Permit. The Environmental Monitoring Program will continue to implement BMPs for construction activities less than acre on site under its current Industrial Activities SWPPP.

The California Small Municipal Separate Storm Sewer System (MS4) General Permit was adopted in 2003 to meet EPA Phase II storm water regulations. In anticipation of being regulated as a non-traditional small MS4, SNL/California has incorporated the six minimum control measures required by the Small MS4 General Permit into SNL/California’s existing Storm Water Management Program. The site has not yet received notification from the RWQCB to apply for coverage under the Small MS4 General Permit.

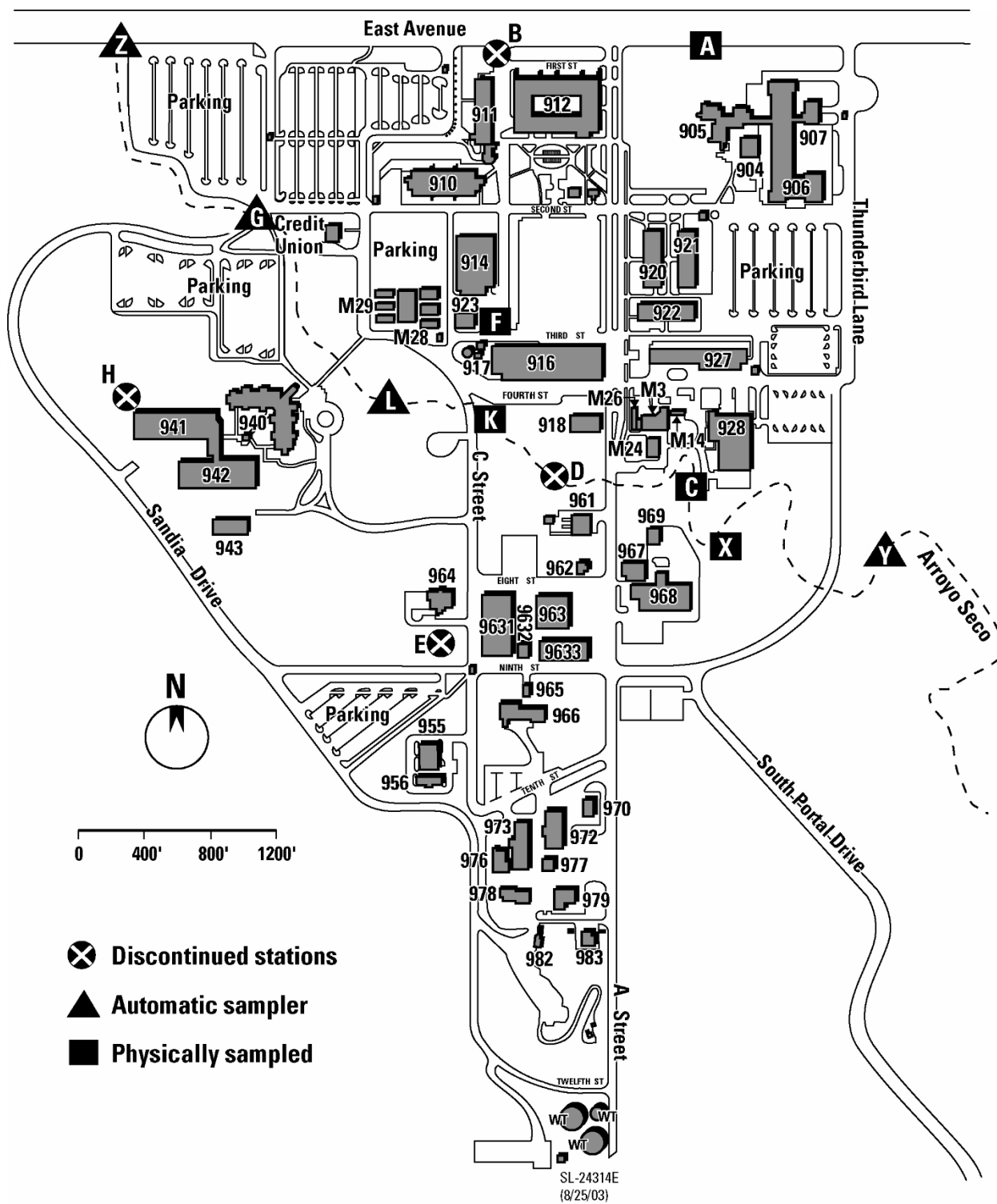
Storm water sampling and analysis are conducted at ten locations on-site (nine of these locations are required by the stormwater regulations, the tenth is to monitor erosion at the Navy Landfill as discussed above). Sampling locations were selected based on the best representation of the drainage areas and types of activities conducted (Fig. 1-6).

Storm water samples are also collected in the Arroyo Seco as it flows onto the site and immediately before it leaves the site.

All storm drain outfalls are visually inspected once a month during the wet season, when surface runoff results in a continuous discharge of storm water for approximately one hour or more. Visual observations help identify if pollutants, such as oil and grease or floating and/or suspended materials, are discharged with storm water.

All storm water outfalls are inspected quarterly during dry weather to identify if non-storm water is being discharged. Visual observations are also done to detect any evidence, such as stains or odors that may indicate a past or intermittent non-storm water discharge.

Figure 1-6 SNL/California site storm water sampling locations



The site is inspected at least once a year to identify outdoor areas or activities that may potentially contribute pollutants to the storm drain system. The site inspection also helps determine if best management practices (BMPs) identified in the SWPPP are being implemented properly and are achieving the objectives of the general industrial storm water permit.

Storm water sampling and sample preservation is done in accordance with EPA standard methods described in Title 40 CFR, Part 136. Samples are analyzed to identify the following parameters, as required by the general industrial storm water permit:

- pH
- total suspended solids
- oil and grease
- tritium
- cyanide
- specific conductance
- nitrate/ nitrite
- metals (As, Cd, Pb, Hg, Ag, Zn, Al, Fe, Mg, Se)
- ammonia
- chemical oxygen demand

Storm water normally is sampled twice during wet seasons, as specified in the general industrial storm water permit. In some years it is not possible to get two samples from each location. This may be due to low rainfall, timing of the storms (during off-work hours), or lack of sampling personnel.

Duplicate samples are collected at random outfalls during each storm in which a sample is collected. Blank samples also are collected to assess the potential for sample contamination.

1.3.4. Groundwater

The migration of pollutants to groundwater could expose the public if the contaminated groundwater is used for drinking water or irrigation. The primary area of groundwater recharge on the Sandia site is the Arroyo Seco. Pollutants that could be released to the Arroyo are metals, pesticides, and priority pollutants (organics). The Groundwater Protection Management Program Plan, details groundwater monitoring at the Sandia site.

DOE/EH-01735T provides guidance on the type of groundwater monitoring DOE facilities should be doing. Groundwater monitoring requirements also are specified by RWQCB Orders 88-142 and 89-184 and subsequent letters from the RWQCB.

1.3.4.1 Environmental Restoration/Long Term Environmental Stewardship

As discussed in Section 1.5.4 there is one area of known groundwater contamination on the SNL/California site, the Fuel Oil Spill Site (FOS). The site is being monitored for natural biodegradation of the diesel. Currently SNL/California is required to monitor two wells at the FOS for TPH-diesel. It is anticipated that the monitoring of the FOS will continue indefinitely. This monitoring comprises the Long Term Environmental Stewardship (LTES) at the

SNL/California site. SNL/California also identified an inactive landfill onsite, the Navy Landfill (NLF). The NLF is a closed site but SNL/California continues to monitor one well (NLF-6) for carbon tetrachloride. Carbon tetrachloride concentrations have been detected in the groundwater. For comparison, the concentrations exceeded the State's drinking water maximum contaminant level (MCL), but do not exceed the Federal MCL.

All remedial actions were completed at the Trudell Auto Repair Shop site, located in the Buffer Zone area, in 1990. SNL/CA discontinued sampling a LLNL monitoring well (MW-406) near the Trudell site. SNL/CA will continue to review and report LLNL monitoring results at MW-406 to ensure no contaminants have been release to the groundwater.

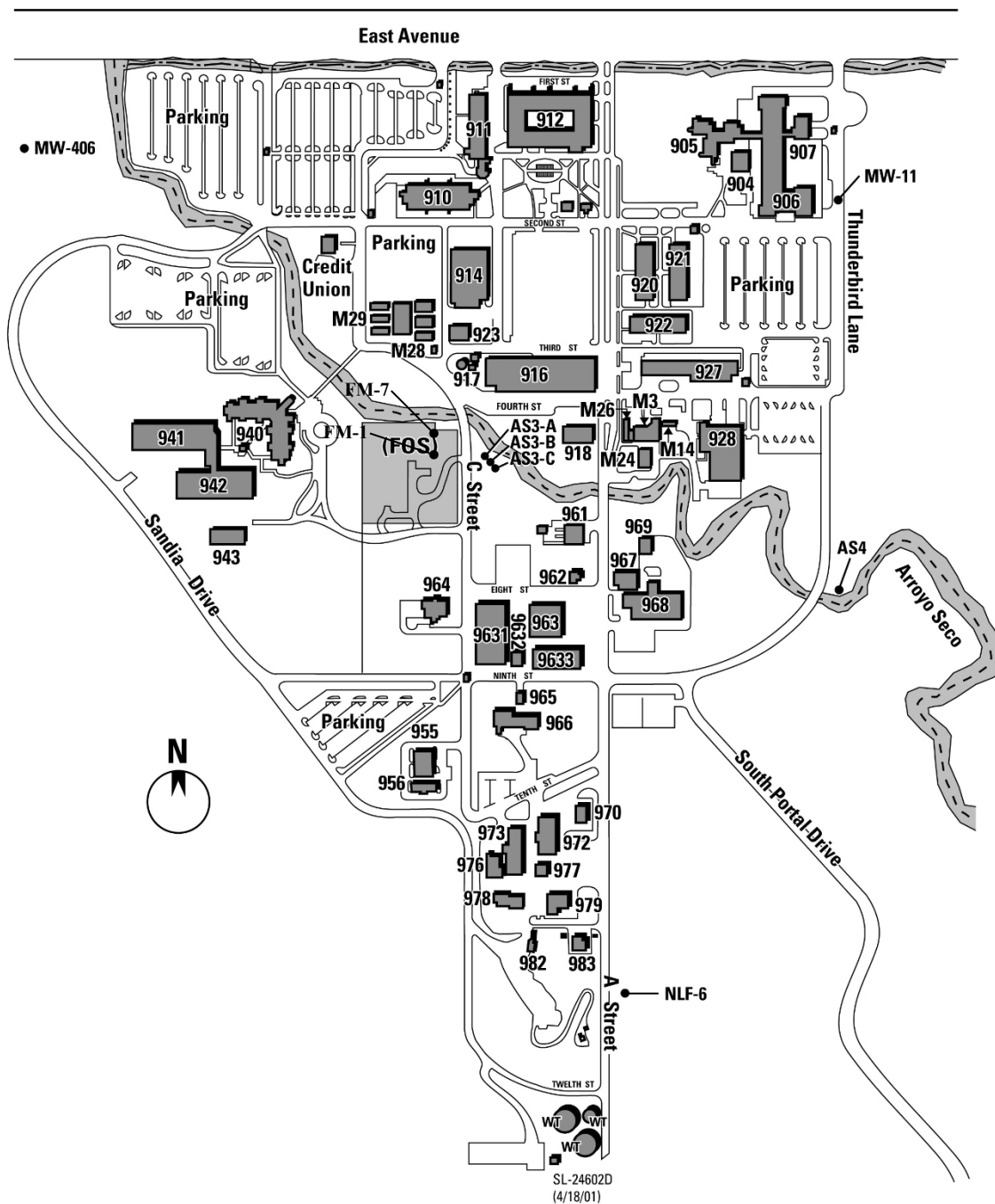
Monitoring wells located at each of these sites are shown in Figure 1-7.

1.3.4.2 Surveillance Monitoring

SNL/California has established four monitoring wells along the Arroyo Seco. One of these wells is upgradient of the site (for background sampling), and the other three are downgradient (for indicator sampling).

Each quarter, a sampling team collects groundwater samples from as many as 7 monitoring wells across the site, including both Long Term Environmental Surveillance and Surveillance Monitoring wells (some wells may not be sampled if the well does not contain enough water). Sample containers, with the appropriate preservatives already added, are provided by the contract laboratory used to perform the analyses. Groundwater samples are stored on ice while in transit to the analytical laboratory.

Figure 1-7 Groundwater monitoring wells on the SNL/California site



2. Program Drivers

SNL/California is required to meet all Federal, State, and local regulations, and DOE Orders concerning protection of the environment. DOE Order 450.1 replaces DOE Order 5400.1 in establishing the requirement to implement sound stewardship practices that are protective of the air, water, and land resources impacted by DOE operations. The *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE/EH-01735T) specifies the elements needed for an adequate environmental monitoring program at DOE sites. This guide provides generic performance criteria for protecting the public and the environment. It specifies actions, equipment, and operating methods DOE facilities should use to assure compliance with Federal regulations and DOE policy.

The following sections list the rules and regulations governing environmental monitoring.

2.1. Department of Energy Requirements

The following DOE Orders apply to SNL/California's environmental monitoring activities:

1. Order 450.1, *Environmental Protection Program*-establishes environmental protection requirements, authorities, and responsibilities.
2. Order 5400.5, *Radiation Protection of the Public and Environment* (Jan. 1993, latest revision).
3. DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*-establishes guidance and mandatory requirements for effluent monitoring and environmental surveillance.
4. Order 0 231.1A, *Environment, Safety, and Health Reporting*-ensures collection, reporting, analysis, and dissemination of information on environment, safety, and health that is required by law or regulation, or that is essential for evaluating DOE operations.

2.2. Federal Regulations

The following Federal regulations apply to SNL/California's environmental monitoring activities:

Title 10, Energy:

1. Title 10 CFR, Part 835, *Radiological Protection*-regulates radiological doses to workers at DOE facilities.
2. Title 10 CFR, Part 830.120, *Quality Assurance*-regulates quality assurance activities at DOE facilities.

Clean Water Act, as amended:

1. Title 40 CFR, Parts 112, *Oil Pollution Prevention and Response; Non-Transportation-Related Onshore and Offshore Facilities; Final Rule*-regulates the above ground fuel tanks.

2. Title 40 CFR, Parts 122-25, *National Pollutant Discharge Elimination System (NPDES)*-regulates the discharge of liquid effluents into bodies of water, including storm water discharge.
3. Title 40 CFR, Part 129, *Toxic Pollutant Effluent Standards and Prohibitions*-adds to the provisions of Title 40 CFR, Part 129 by restricting the discharge of listed toxic pollutants.
4. Title 40 CFR, Part 403, *General Pretreatment Regulations for Existing and New Sources of Pollution*-establishes the government's responsibility to prevent the discharge of waste that would reduce the treatment efficiency of a Publicly-Owned Treatment Works (POTW).
5. Title 40 CFR, Part 433, *Metal Finishing Point Source Category*-establishes discharge standards for metal finishing operations; SNL/California has one processes that falls into this category but does not discharge to the sanitary sewer and one process that closed in 2006 and no longer discharges to the sanitary sewer.
6. Title 49 CFR 469.12(2) establishes discharge standards for semiconductor operations.

2.3. California Regulations

The following State regulations, among others, apply to SNL/California's environmental monitoring activities:

1. Title 23 CCR, Division 3, Chapter 1, *State Water Resources Control Board and Regional Water Quality Control Boards*-establishes the authority and procedures of the boards; adopts EPA standards (Title 40 CFR, Part 122-125) for NPDES permitting and reportable quantities of hazardous materials.
2. Title 23 CCR, Division 3, Chapter 9, *Designation, Reportable Quantities, and Notification*-defines the standards for detection and monitoring associated with waste management units.
3. Title 17 CCR, *Public Health*, Chapter 5, Subchapter 4, "Radiation"-covers the form and function of the California Department of Health Services (DHS), and regulations for the implementation of State environmental acts.
4. *Safe Drinking Water and Toxic Enforcement Act of 1986*-prohibits any chemical that the State of California certifies as a known carcinogen or reproductive toxin from being discharged into an actual or potential source of drinking water; requires the Governor to publish and annually update a list of chemicals determined to cause cancer or reproductive toxicity; and requires employers to notify workers of the presence and potential exposure to chemicals on the list.

2.4. Local Regulations

The following are the principal local regulations that apply to SNL/California's environmental monitoring activities:

1. City of Livermore, Municipal Code Section 13.32, *General Discharge Prohibitions*—contains regulations concerning wastewater discharges to the sanitary sewer, including processes covered by the Federal Categorical Pretreatment Standards. This section also contains limitations of discharge of specific pollutants.

2. City of Livermore, Municipal Code Section 13.45, *Storm Water Management and Control Program*—contains regulations controlling storm water discharge to the municipal storm drain system. As a federal facility outside the City boundary, Sandia/California is not regulated by the City's local stormwater program, however, the site strives to remain a good environmental citizen in its local community.
3. Alameda County Health Department, California Health and Safety Code Division 20, Chapter 6.7, 25280-25299.8-establishes standards for construction, operation, maintenance, inspection and testing of underground storage tanks (USTs).

2.5. Legal Changes and Modifications to Program

Federal Regulations 40 CFR part 112 were revised December 2006. The new regulations extend the compliance dates for required sites to amend current Spill Prevention Control and Countermeasure (SPCC) Plans to ensure compliance with the July 2002 regulations and amends the qualified oil-filled operational equipment. The Plan and new requirements must be implemented by October 31, 2007. The Environmental Monitoring Program plans to update the site Plan in the Summer 2007.

2.6. Process to Maintain Legal Requirements

Sandia Corporate Legal department is responsible for informing the Environmental Monitoring Program Lead of any changes in federal regulations that would affect one of the program areas. In addition, Program staff include consultants who, as part of other projects with municipal stormwater programs and Publicly Owned Treatment Works and regular interaction with regulatory agency staff, keep abreast of federal, state and local changes in regulations. An example is consultants passing along information from the Caltrans Water Quality NewsFlash, CASQA newsflashes, Bay Area Pollution Prevention Group meetings, Bay Area Clean Water Agency, Bay Area Stormwater Management Agencies Association and RWQCB Board meetings. Program staff have a subscription to Above Ground Storage Tank Guide and Underground Storage Tank Guide. Program staff also maintain memberships in professional associations pertinent to the Environmental Monitoring Program (including the California Water Environment Association, Water Environmental Federation, and International Society for Industrial Ecology), receive email bulletins from the State Water Quality Control Board and share a subscription to the California Environmental Insider.

3. Operational Controls

The Environmental Monitoring Program uses technical work documents, administrative and engineered controls, and specialized equipment as operational controls. Table 3-1 lists the technical work documents applicable to Environmental Monitoring Program operations. They include the corporate ES&H manual, operating procedures, preliminary hazard screening documents, hazard assessments, and other site-specific requirements. Fume hoods are used as engineered controls to minimize contact with hazardous chemicals used to preserve samples. Administrative controls include signs stating that only authorized personnel shall access potentially hazardous areas, such as the LECS pits.

3.1. Operating Procedures

Environmental monitoring activities are described and documented in the Operating Procedures listed in Table 3-1. In addition to monitoring activities Environmental Monitoring Program staff have developed several documents to address quality control, data review and management practices for the portions of the environmental monitoring system under SNL/California's direct control.

3.2. Laboratory Procedures

Accurate laboratory analyses are critical to any environmental monitoring program. SNL/California's laboratory analyses include an appropriate number of blanks, duplicates, and spiked pseudosamples in order to assess accuracy and precision.

Contract laboratories used by SNL/California also must be accredited under either the National Environmental Laboratory Accreditation Program (NELAP), or by the State of California's Environmental Laboratory Accreditation Program (ELAP), or both. To receive accreditation, a laboratory must implement a quality assurance plan. These laboratories are periodically inspected by the California Environmental Protection Agency to ensure that they are operating within regulatory and quality assurance requirements. Sandia personnel do not audit the laboratories.

SNL/California performs the tritium analyses of storm water. The SNL/CA Health Physics Laboratory follows the guidance in the SNL Radiation Protection and Laboratory Services Quality Plan (SNL 2002), and meets the Sandia and DOE quality criteria.

The following sections summarize the analyses done on samples from each of the environmental media. More detailed information is available in the referenced procedures.

3.2.1. External Radiation

TLDs collected by SNL/California personnel are processed by the Health Instrumentation Department at SNL/New Mexico following established protocols and quality assurance/quality control requirements under the SNL Radiation Protection and Laboratory Services Quality Plan (SNL 2002). These TLDs are stored in a lead shield until they are processed. The readout data are analyzed with software that allows the systematic and uniform processing of data for each location. The net field results are compared to the calibration values. This comparison yields the field exposure in microrentgen (μR) per hour.

The TLDs collected by LLNL personnel are processed by LLNL's Hazards Control Department using automated equipment. The TLDs are stored in a lead shield until they are processed.

Table 3-1 Program Technical Work Documents

ES&H Manual	
Chapter 10 H	Discharges to the Sanitary Sewer System
Chapter 10 K	Underground Storage Tanks
Chapter 10 N	Discovering and Reporting a Potential Past Waste Release Site
Chapter 10 T	Surface and Storm Water Discharges
Chapter 17 E	Radionuclide National Emissions Standards for Hazardous Air Pollutants (NESHAPs)
Primary Hazard Screen (PHS)	
SNL8A00186-011	Environmental Monitoring
Operating Procedures	
Sanitary Sewer Monitoring	Sanitary Sewer Outfall Monitoring (OP471410)
	Incident Reporting (OP471608)
	Categorical Process Monitoring (OP471409)
	Satellite Sanitary Sewer Automatic Sampler Operating Procedure (OP472228)
Liquid Effluent Control	968 Liquid Effluent Containment System (OP471097)
System Operation and Monitoring	906 Liquid Effluent Control System (LECS) (OP471452)
	910 Liquid Effluent Control System (LECS) (OP471453)
	916 Liquid Effluent Control System (LECS) (OP471454)
	941 Liquid Effluent Control System (LECS) (OP471455)
	Operating Procedure for In-Field Metals Analysis (OP471790)
Stormwater Monitoring	Non-stormwater Discharge Visual Observations (OP471089)
	Stormwater Discharge Visual Observations (OP471090)
	Storm Water Sampling and Analysis (OP471091)
	Annual Comprehensive Site Compliance Evaluation (OP471724)
	Preventative Maintenance of Storm Drain System (OP471791)
External Radiation	Storm Drain Spill Prevention and Control (OP471741)
	Quarterly Replacement of Thermoluminescent Dosimeters (OP471305)
Groundwater	Groundwater Sampling (OP471701)
General Programmatic	Environmental Monitoring Program Database (OP471716)
	Data Validation and Verification for the Environmental Operations (OP471131)
	Data Analysis for the Environmental Surveillance Program and Wastewater/Stormwater Program (OP471304)
	Control of Samples by the Environmental Operations Department (OP471310)
	Nonconformance Reporting, Form Logging and Tracking (OP471411)

3.2.2. Storm Water Runoff

The SNL/California Health and Safety Protection Department analyzes tritium samples by liquid scintillation counting, a standard technique for tritium analysis.

The non-radiological samples are sent to a State-certified contract laboratory, where they are processed according to EPA standards.

3.2.3. Groundwater

Groundwater samples from the monitoring well sites are sent to a State-certified commercial laboratory for analysis. They are processed according to EPA methods. The analyses performed are (depending on the location) volatile organics, semi-volatile organics, title 22 CCR organics, diesel, minerals, metals (As, Ba, Be, Cd, Cr, Pb, Hg, Se, Ag), and tritium.

3.2.4. Liquid Effluent Control Systems

Samples from the LECS may be sent to a State-certified laboratory for analysis. The samples are analyzed using appropriate EPA methods. Analyses are performed for regulated constituents used in the process generating the effluent.

The contents of the Bldg. 961 LECS are analyzed for radionuclides, metals, cyanide, volatiles, and semi-volatiles as indicated by process knowledge.

3.2.5. Sanitary Sewer

A State-certified contract laboratory using standard EPA methods conducts all metals, organics, and physical analyses.

4. Documents Produced

4.1. Data Management

Environmental monitoring data from the LECS analyses, storm water analyses, direct radiation, and sewer outfall analyses are kept in an electronic database. The ES&H Records Center also keeps a hard-copy file.

4.2. Reports and Permits

Table 4-1 lists the permits held by SNL/California for discharge of effluents, the category for each discharge, the regulatory agency and regulations governing each discharge, and the permit status. Table 4-2 lists other documents and reports generated by the Environmental Monitoring Program.

The Environmental Monitoring Program provides input to the Annual Site Environmental Report. This report summarizes all environmental monitoring data and all environmental

activities at the SNL/California site. This report is the only mechanism for reporting groundwater and external radiation data.

Table 4-1 SNL/California Environmental Permits

Category	Regulation/Authority	Permit Status
Wastewater Discharge	City Ordinance, City of Livermore	Permit for the site sanitary and industrial wastewater discharge; Permit renewed annually
Storm Water Discharge	Clean Water Act (Title 40 CFR 122-124), EPA National Pollutant Discharge Elimination System, State Water Resources Control Board, Regional Water Quality Control Board, City Ordinance, City of Livermore	SNL/California has a Notice of Intent (NOI) on file with the State Water Resources Control Board (SWRCB). As a result, Sandia is covered by the State's National Pollutant Discharge Elimination System (NPDES) General Permit for Discharge of Storm Water Associated with Industrial Activities. Permit renewed every five years.
Underground Storage Tank	RCRA and California Health and Safety Code	Renewed annually with Alameda County Environmental Health Department
Above-ground Storage Tank	Title 40 CFR 112, RCRA and California Health and Safety Code	Renewed every 2 years with SWRCB

Table 4-2 Environmental Monitoring Program Documents and Reports

Document	Due Date	Frequency of Distribution	Distribution	Required by
Wastewater Discharge Permit Application	6/4/2007	Annual	City of Livermore	City of Livermore
Categorical Process Report	Jan. 20, July 20	Semi-annual	City of Livermore	City of Livermore
Spill Prevention Control and Countermeasure Plan (SPCC)	8/1/2009	Every 5 years	DOE/SSO	Regional Water Quality Control Board (RWQCB)
Wastewater Discharge Report	20 th of each month	Monthly	City of Livermore	City of Livermore
Spill/Slug Plan	6/30/2007	Every 2 years	DOE/SSO	City of Livermore
Groundwater Surveillance Monitoring Program Plan	July 2008	Every 3-5 years	DOE/SSO	DOE/SSO
Stormwater General Industrial Permit	Renewed July 1997	One time only	RWQCB	RWQCB
Stormwater Pollution Prevention Plan	Continually updated	Reviewed annually	RWQCB	RWQCB
Stormwater Discharge Report	7/1/2007	Annual	RWQCB	RWQCB
NESHAPs Letter Report	6/30/2007	Annual	EPA Region IX	EPA Region IX

4.3. Document Control

DOE Environmental Regulatory Guide ES-0173T requires that auditable records of the environmental surveillance and effluent monitoring programs be maintained. The records are to include calculations, computer programs, procedures, and raw data.

SNL/California's *Quality Assurance of Data, Documents, and Select Activities of the Environmental, Safety, and Health Departments, 8516 and 8517* (April 2005) includes details of a document control system. The system includes guidance on safeguarding, handling, and archiving documents. Each Department is responsible for determining which of its records are to be classified as Quality Assurance Records.

The Site Operations Center has established a Document Control Center. Procedures have been written for document submittal, storage, and use.

All environmental monitoring plans, procedures, and data were designated quality assurance records during the data archiving process.

5. Approved Job Descriptions, Qualifications, and Job Specific Training

The Environmental Monitoring Program staff consists of the Program Lead, an Environmental Management Technologist and contractor staff. Program staff rely on additional help from other department staff to conduct stormwater sampling. Stormwater sampling locations on site are extensive (10 locations with duplicate and blank samples) and the sampling is time critical (permit requirements to attempt sampling during the first hour of discharge, sampling all locations during the same storm event, and time limitations on transporting samples to the contract laboratory). The program staff assignments and responsibilities are described below. Personnel assignments are presented in Appendix A.

5.1. Environmental Monitoring Program Lead

The Environmental Monitoring Program Lead is responsible for managing and overseeing operations and monitoring, administering permits, reporting requirements, final review of analytical data and developing special studies as needed (e.g. satellite sewer sampling, emergent chemical groundwater sampling, etc.). Specifically the Environmental Monitoring Program Lead is responsible for:

- managing and overseeing sewer outfall operations that include administering permit and reporting requirements. The Environmental Monitoring Program Lead is responsible for addressing significant changes in the discharge parameters, and for investigating potential source(s) of pollutants in the wastewater, and identifying the actions necessary to prevent recurrence. The Environmental Monitoring Program Lead is also responsible for final review of analytical results.
- managing and overseeing LECS operations, which include data review and authorizing the discharge of LECS wastewater. The Environmental Monitoring Program Lead is

responsible for investigating the source of unexpected pollutants in the LECS wastewater and identifying the actions necessary to prevent the reoccurrence of the discharge. The Environmental Monitoring Program Lead also coordinates the disposal of the wastewater if it is unsuitable for discharge to the sanitary sewer system.

- implementing the groundwater monitoring operations, which include reporting requirements. The Environmental Monitoring Program Lead is responsible for final review of analytical results.
- initiating activities to identify the source of non-stormwater and other pollutant discharges. The Environmental Monitoring Program Lead assists Environmental Management Technologists with the collection of stormwater samples. The Environmental Monitoring Program Lead works with site organizations to prevent non-stormwater and pollutant discharge to storm drains.
- The Environmental Monitoring Program Lead also has the responsibility for the environmental restoration program at SNL/California. In this capacity, the Program Lead is responsible for addressing any erosion issues at the NLF, and continuing monitoring of the Fuel Oil Spill site.
- determining the locations of the site TLDs. The Program lead is also responsible for obtaining and analyzing results from the laboratory, completing non-conformance reports, preparing data for the Annual Environmental Report, and archiving data.
- managing and overseeing the data collection process. The EM Program Lead is responsible for final review of all data from the above mentioned programs.
- evaluating, trending, archiving and ensuring the quality of data from the analytical laboratories including radiological monitoring data from Health Physics.
- entering the electronic laboratory results into the Environmental Monitoring database and making periodic back-ups of the database. The Environmental Monitoring Program Lead is responsible for assuring the consistency and quality of the data in the database.
- Reviewing and reporting on sources of radioactive air effluents in accordance with 40CFR61 (NESHAPS).

5.2. Environmental Management Technologist

The Environmental Management Technologist is generally responsible for sampling activities, maintaining records, such as analytical data and logs, maintaining equipment, preparing samples for shipment and informing the Environmental Monitoring Program Lead of any unusual condition, situation or possible violations of limits. These responsibilities are included for all program areas, LECS, sewer outfall, groundwater, stormwater, TLDs and any special studies being conducted, such as the satellite sewer sampling and potable water sampling. Specifically the Environmental Management Technologist is responsible for:

- conducting the routine operations and monitoring activities for the LECS, including sampling and maintaining any LECS records such as analytical data, sampling logs and pH meter calibration records. The Technologist is also responsible for preparing the samples for shipment. It is the responsibility of the Environmental Management Technologist to advise the Environmental Monitoring Program Lead of any unusual condition or situation that could require the shut down of the LECS.

- conducting the quarterly sampling of the groundwater monitoring wells, and maintenance of all groundwater monitoring equipment. The Technologist is also responsible for preparing the samples for shipment. It is the responsibility of the Environmental Management Technologist to advise the Environmental Monitoring Program Lead of any unusual condition or situation that could affect the groundwater monitoring or reporting requirements.
- conducting the sampling of the sewer outfall, maintaining all sewage monitoring equipment, and keeping an inventory of supplies at the sanitary sewer monitoring facility. In addition, the Technologist is responsible for initial review of the analytical results and notifying the Environmental Monitoring Program Lead of potential violations of permit limits or other unusual conditions. Finally, the Technologist is responsible for maintaining records such as log books, analytical data, and calibration records.
- performing stormwater visual inspections, collecting the stormwater samples, notifying the contract laboratory of the potentially large sample load, completing the sampling documentation (i.e. stormwater sampling event form, sampling log book, and chain of custody form), and maintaining documentation. The Technologist is also responsible for preparing the samples for shipment. The Technologist is also responsible for informing the Environmental Monitoring Program Lead of 1) any evidence observed while conducting the sampling that may indicate a non-stormwater or other pollutant discharge and 2) any evidence of erosion at the (NLF) area.
- distributing and collecting TLDs, completing chain-of-custody forms, and shipping TLDs to SNL/NM;
- supporting Environmental Planning with wildlife biology activities;
- inspect construction sites for proper operation and maintenance of BMPs

5.3. Environmental Monitoring Contract Engineer(s)

The Environmental Monitoring Engineer Contractor(s) provides guidance to the Environmental Monitoring Program Lead on regulatory requirements and implementation, provides draft regulatory reports, updated or new operating procedures, reports and other program documentation. The Engineer Contractor(s) assist with stormwater inspections, groundwater sampling, stormwater sampling, and other monitoring activities.

5.4. Staff Qualifications

Environmental Monitoring Program personnel have a responsibility to effectively implement environmental requirements and objectives in a range of areas including stormwater, wastewater, groundwater, radioactivity and above ground fuel storage tanks. Staff must have a knowledge of environmental monitoring and environmental regulations and be able to work with disciplines across all site operations. Environmental Monitoring Program personnel must meet the following qualifications.

Table 5-1 Environmental Monitoring Program Staff Qualifications

Job Title	Education	Experience	Required	Recommended
Environmental Management Technologist	AA and/or five years of relevant environmental experience	environmental, science, or engineering	X	
Environmental Monitoring Program Lead	BS and/or five years of relevant environmental experience	environmental, science, or engineering	X	
	Environmental Certification	Professional Certification (e.g. Certified Environmental Auditor or Registered Environmental Manager from the National Registry of Environmental Professionals)		X
Environmental Monitoring Contract Engineer(s)	BS	environmental, science, or engineering	X	
	MS	environmental, science, or engineering		X
	Environmental Certification or Professional Engineering Certification	Professional Registration (e.g. Civil Engineer, Geologist, etc.)		X

5.5. Training

All program staff must meet all required corporate training.

All personnel who conduct stormwater sampling and wet weather observations receive annual training before the start of the wet season (October) by an Environmental Monitoring Program staff. Training records are kept by the Environmental Monitoring Program.

The Program Lead and the Environmental Management Technologist responsible for conducting the groundwater sampling must have, at least, 24 hour Hazwoper training.

Other job specific training required is offered by the Corporate Education Development and Training (CEDT) program. The table below presents all of the activity-specific required and recommended training. The Environmental Management Technologist, Program Lead and any other personnel providing backup for the specific program activities below must have the required training.

Table 5-2 Training Requirements

Training Requirement	Training Method	Environmental Monitoring Program Lead	Environmental Management Technologist	Environmental Monitoring Contract Engineer(s)
Stormwater sampling and wet weather observations	Classroom	•	•	•
ENV 100 40 Hour HAZWOPER	Commercially available	•	•	
ENV 103 OSHA Health & Safety Refresher (Hazwoper)	Commercially available online	•	•	
ENV 112 CA Hazardous Waste Generator Training	Classroom	•	•	•
ESH 300 Self Assessment Training	Classroom	•		
LAB 100 Lab Standard Information & Training	Online		•	
PKX 100 Basic Hazardous Material Transportation	Online	•		
MED 113 Bloodborne Pathogens	SNL classroom	•	•	
BIO 105 CA Biosafety in microbiological and biomedical laboratories at SNL/CA	SNL classroom	•	•	
FPP 105CA Fall Protection and Prevention ¹	SNL classroom	•	•	•
CNF 105 Confined Space Awareness	SNL classroom	•	•	
CNF 107 Confined Space Entry	SNL classroom, field	•	•	
RAD 102 General Employee Radiological Training	Online	•	•	•
RSP 215 Air-purifying Respiratory Protection	Online & hands-on		•	
FKL 153 Forklift Operator Training	Classroom, hands-on		•	
FKL 153R Forklift Refresher	Online & hands-on		•	
HAZ 103 Site-specific Hazcom	Classroom	•	•	

EM Program staff are working with safety staff to determine if this course is required for certain stormwater sampling locations during sampling or automatic sampler set-up.

5.6. Specialized Assignments / Certifications

The Building 964 Underground Storage Tank (UST) owner designates one or more individuals to have responsibility for training facility employees and conducting monthly visual inspections at the underground storage tank facility. Designated UST operators shall possess a current certificate issued by the International Code Council (ICC) indicating he or she has passed the California UST System Operator exam. The individual shall renew the ICC certification, by passing the California UST System Operator exam, every 24 months. Currently the Designated UST operator is a Maintenance Department Technologist.

6. Performance Measures

Environmental Management System (EMS) environmental targets and objectives are reviewed and updated for the Environmental Monitoring Program annually. The performance measures are used to indicate the degree of success in meeting those targets. The targets for the Environmental Monitoring Program for 2006 were:

- 100% of new construction will have post-construction runoff coefficients equal to or less than pre-construction runoff coefficients;
- 100% inspection/cleaning of on-site storm drain system including drop structure by October 1 of each year;
- Identify all materials requiring erosion control, and implement controls.
- Achieve concentrations of copper and zinc in the sanitary sewer of less than 30% of the discharge limit.

The results for meeting these targets in 2006 can be expressed numerically through the use of metrics, as seen below in the four graphs, for some targets or qualitatively for other targets. Some of these targets require actions by other departments. Activities performed directly by Environmental Monitoring Program staff to reach the targets are:

- Create an appropriate set of BMPs to implement on future projects and provide to facilities so they can be incorporated into designs.
- Inspect construction sites for compliance with stormwater regulations.
- Work with facilities to develop implementation methods for targets

In October 2005 Environmental Monitoring staff met with Facilities Department staff to present stormwater educational information and BMPs. At this presentation they received a *Post-Construction Best Management Practices* binder compiled by Environmental Monitoring Staff and the Alameda County Clean Water Program *Protecting Water Quality in Development Projects: A Guidebook of Post-Construction BMP Examples* (August 2005). In 2006 impervious surface was added to the site through the construction of a small parking lot near the new badge office. Facilities incorporated a swale to collect the parking lot drainage before it is discharged to the storm drain system into the construction project.

In 2006 Environmental Monitoring staff met with Maintenance Department staff to assist with improved recording keeping for inspection/cleaning of the storm drain system. Environmental Monitoring staff believe much of the difference between the percent inspection/cleaning reported for 2006 and the 100% target is due to imprecise record keeping in the field. The Maintenance Department staff have been taking steps to improve logs and training in record keeping for field crews.

The Environmental Monitoring Program has performance measures that are continuously used to assess the performance and effectiveness of the program. The measures are:

- Meet all regulatory monitoring requirements (GW, WW, SW)
- Meet regulatory report due dates (semi-annual categorical report, wastewater permit application, annual stormwater report, monthly wastewater discharge reports)
- Direct involvement with staff from Maintenance, Project Engineering & Operations or Planning & Construction Management departments about SW issues.

- Meet quality assurance accuracy, precision and completeness goals
- Compliance with stormwater BMP requirements in the site's Industrial SWPPP
- Compliance with wastewater permit limits at the outfall

Currently the Program is meeting all monitoring requirements, and regulatory report due dates. The quality assurance accuracy, precision and completeness goals will be reported for calendar year 2006 in the Annual Site Environmental Report. The site is currently in compliance with wastewater discharge permit limits. The most recent quarterly non-stormwater discharge visual inspection of the site showed only minor issues that were immediately corrected. Program staff continue to have direct communication with maintenance and engineering staff through IDT meetings, direct phone calls and presentations to department staff.

The Environmental Monitoring Program also uses metrics to show progress in achieving goals. These metrics are updated on the Environmental Management webpage. The following four graphs present water use, sanitary sewer flow, and sewer water copper and zinc concentrations per year.

Figure 6-1 Water Use Metrics

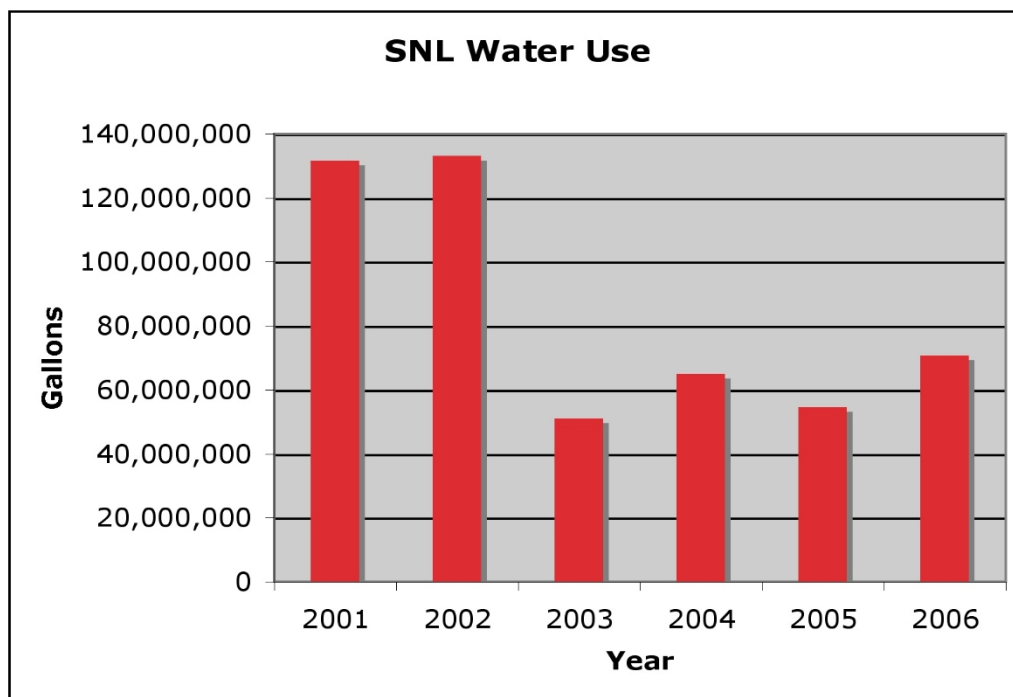


Figure 6-2 Sewer Flow Metrics

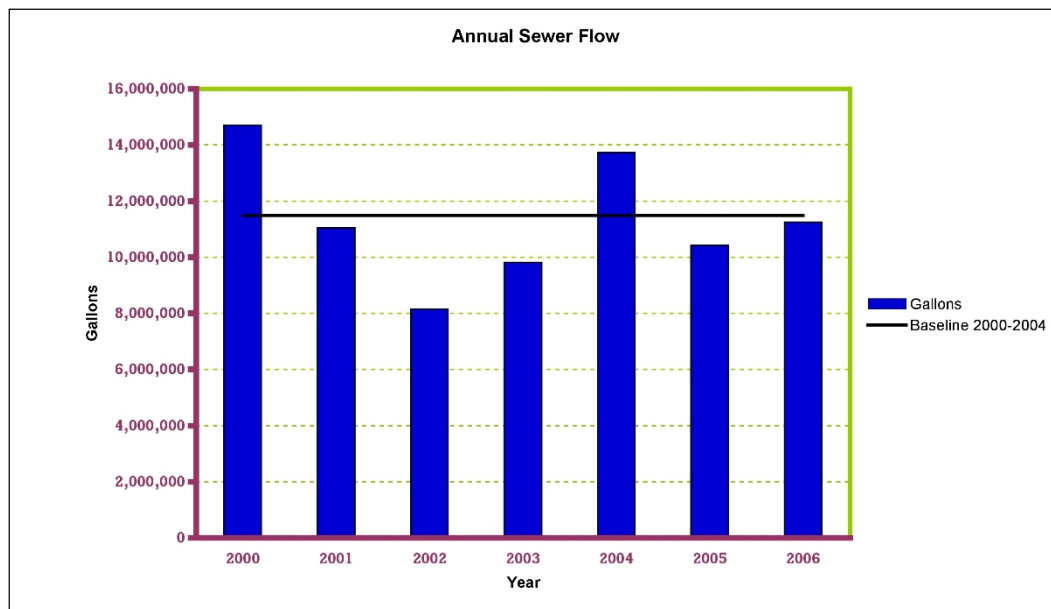


Figure 6-3 Environmental Monitoring Metrics: Copper in the Sanitary Sewer

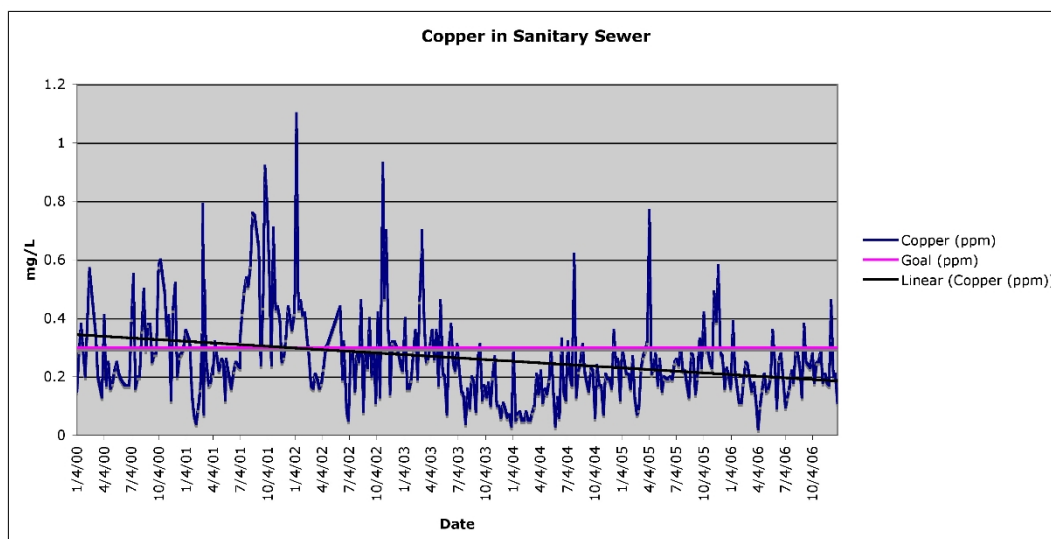
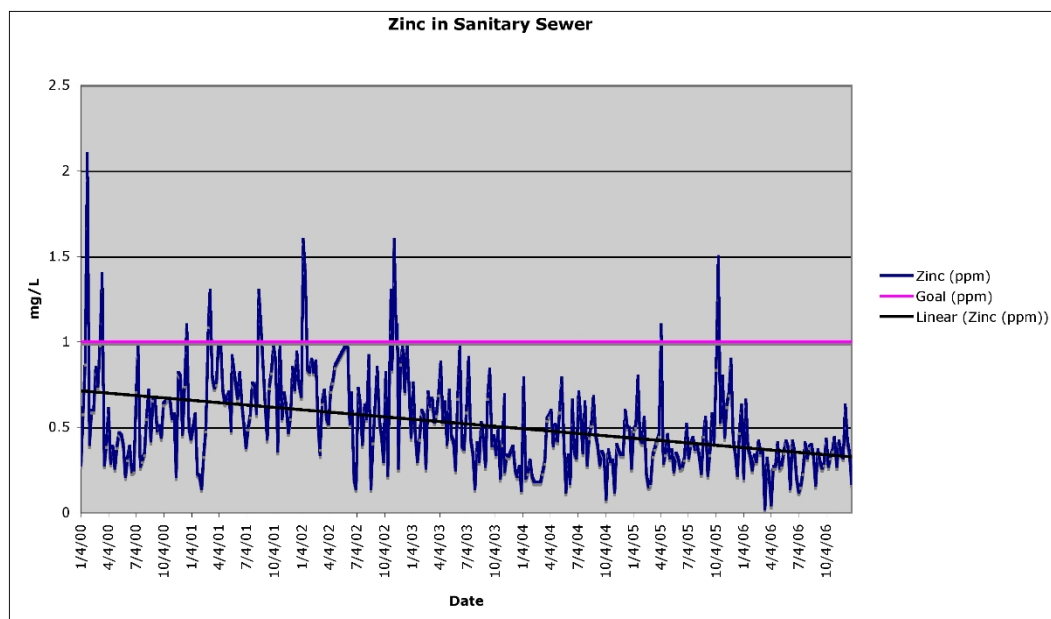


Figure 6-4 Environmental Monitoring Metrics: Zinc in the Sanitary Sewer



7. Quality Assurance

7.1. Program Risk Assessment

Annually, the Environmental Monitoring Program performs a risk assessment (see Appendix B) as part of the decision making process to determine the appropriate level of formality required for Program activities. It was determined that the greatest risk associated with the Environmental Monitoring Program was the risk of a hazardous material spill getting into the sanitary sewer, storm drain, or groundwater. The source of the hazardous material could be from an accidental spill, an intentional discharge, or through discovery of a site contaminated by previous site operations. The overall risk from intentional discharges and discovery of past contamination was determined to be low. The risk from an accidental spill was determined to be medium. Measures taken by the Environmental Monitoring Program to mitigate this risk are 1) the provision of secondary containment pallets for chemicals stored outdoors, 2) the requirement that all chemical containers greater than one liter be stored in secondary containment in laboratories, and 3) annual site stormwater inspections.

7.2. Sample Analyses

SNL/California has established criteria for the acceptability of environmental monitoring data in the *Operating Procedure for Data Validation and Verification for the Environmental Monitoring Program*. This procedure contains methods for determining the accuracy, precision, completeness, comparability, and representativeness of the data. In general, the following methods apply to Environmental Monitoring Program sampling activities:

- **Accuracy** is assessed through analysis of samples that have been spiked with the analyte of interest (spiked samples), standard reference materials, or interlaboratory comparison samples. The analytical results are compared to the known value of the spiked sample or standard reference material.
- **Precision** of the combined sampling and analysis effort is assessed through collection and analysis of duplicate samples. Data sets of routine samples are compared to data sets of duplicate samples. Recognizing that the uncertainty of analytical results increases as the detection limit is approached, we base the acceptance criteria, in part, on the pollutant concentration. Precision of the analytical effort only is assessed in the laboratory by the use of split samples.
- **Completeness** of the data is assured by careful planning of the sampling locations and frequency. Close attention is also paid to the reliability of the sampling equipment used. Completeness is evaluated by comparison of the number of samples collected to the number planned to be collected.
- **Comparability** is assured by using proceduralized sample collection methods and using standardized analytical methods.
- **Representativeness** is secured by careful selection of the sample collection methods and analytical methods to assure you are measuring what you want to measure.

To assure that the data generated by the monitoring program may be compared to data of other monitoring systems, EPA methods are used, when available, for collecting and analyzing samples. When EPA methods or guidance are not available, Sandia develops its own methods. These methods are documented and provided, as requested, to the agencies receiving reports to aid in interpretation of the data. For further discussion see Laboratory Procedures, Section 3.6 above.

7.3. Environmental Sampling

Sample collection methods assure that the samples represent, as much as possible, the environmental medium being monitored. Considerations include the spatial and temporal variability of the medium or the pollutant of concern within the medium. If EPA- or DOE-approved criteria for sample locations exist, they are used.

Protocols for environmental sampling at SNL/CA are contained in activity specific operating procedures. Elements of these protocols include appropriate sampling methods and equipment; sampling frequency; sampling locations; and sample handling, storage and packaging. Chain-of-custody protocols are also used to ensure quality control through proper transfer of samples from the point of collection to the analytical laboratory.

All analytical data reports are reviewed by the Program Lead and documented on the Chemical Analysis Report Verification Record Form. All stormwater inspection reports are reviewed by the Program Lead and documented on the Stormwater Inspection Report Tracking Form. The internal requirements for filling out this documentation are described in the applicable operating procedures.

Non-conformances, such as the failure to collect a scheduled sample, are documented in the Environmental Program Non-conformance Report Log.

7.4. Quality Control Samples

Types of quality control samples prepared for the Environmental Monitoring Program include field duplicates, spiked, trip blanks and field blank samples. A definition of each sample type follows.

Duplicate samples are collected at the same time and location, and follow the same method, as a routine sample. These samples are used to assess the precision of sample collection and analytical processes.

Spiked samples resemble a routine sample, but contain a known amount of one or more of the constituents of interest. These samples are obtained from an independent laboratory that certifies the concentration of the constituents.

Blank samples resemble a routine sample matrix (e.g. deionized water is used for blank water samples), but lack the constituents of interest. These samples are used to assess background levels of constituents, and possible contamination of the samples in the laboratory or in the field.

SNL/CA's goal for number of quality control samples is 20% of the total sample load, where feasible. This includes quality control samples initiated at the laboratory.

7.5. Statistical Analyses

Statistical analyses are used to determine completeness, precision, and accuracy of monitoring and surveillance data. Prior to performing statistical analyses, the data is normalized to ensure that valid results are obtained. Descriptions of the statistical tests follow.

Completeness is evaluated by determining the ratio between the number of samples collected and the number of samples scheduled for collection. The data quality objective for completeness is 85%.

Precision is evaluated using three methods: determining the ratio between routine and duplicate samples; tests of significant difference; and calculating the 95% confidence interval. Data quality objectives vary for precision depending on the results of laboratory analyses.

Accuracy is also evaluated using three methods: determining the ratio between sample results and known values of spiked samples; tests of significant difference; and calculating the 95% confidence interval. Data quality objectives vary for accuracy depending on the results of laboratory analyses.

8. Program Assessments

For the Environmental Management Department the following two program assessments are performed annually for each environmental program:

8.1 Program Self Assessment

The Program Self Assessment is an annual effort to determine the completeness, quality and efficiency of the program structure and management. It is also used to determine the alignment of the program with ISO14001 EMS requirements and principles.

The objective of this assessment is to assure that the program provides all of the required elements and continually strives for areas of improvement. This assessment includes a review of all procedures, processes, technical work documents, web pages, publications, communications, etc. of the program to assure that they are streamlined, accurate and current. The *Programmatic Document Review Form* is used to document this part of the self assessment, as referenced in the *Quality Assurance of Data, Documents and Select Activities of the Environmental, Safety and Health Departments, 8516 and 8517*.

In 2006 the Environmental Monitoring Program focused on Sanitary Sewer Outfall and Satellite Sampling Equipment for the Self Assessment Program Area. The results were reported in the June 20, 2006 *Environment, Safety, and Health Assessment Report: Environmental Monitoring Program Self-Assessment Summary Report*. There were no findings identified in the self-assessment (see Appendix C). There were several observations/recommendations identified. Table 8-1 documents the resolution status of these items. In addition to the observations and recommendations there was one investment opportunity that was identified. This opportunity was to install solar panels on the second satellite sewer sampler if the first installation is successful.

Table 8-1 LECS Equipment Self Assessment Observations/Recommendations Status

Observations/Recommendations	Status (at time of publication)
There is no operating procedure for the satellite sewer samplers.	Satellite Sanitary Sewer Automatic Sampler Operating Procedure OP472228 completed.
The Environmental Management Technologist believes the fume hood located in the outfall trailer may not be adequate for certain uses.	IH Program staff were contacted in October 2006. IH staff inspected the area, had concerns and indicated a follow-up visit was needed. IH staff have not completed the follow-up visit or provided written findings of the initial visit.
There is no operating procedure for the Batch Treatment System at Building 916 operated by the Maintenance Department.	Environmental Monitoring Program Lead contacted the Maintenance Department staff by email to offer assistance with developing an OP. Maintenance responded the OPs had already been assigned to staff but have not yet been finalized.

Observations/Recommendations	Status (at time of publication)
There is no operating procedure for the Wash Pad operated by the Maintenance Department.	Environmental Monitoring Program Lead contacted the Maintenance Department staff by email to offer assistance with developing an OP. Maintenance responded the OPs had already been assigned to staff but have not yet been finalized.
The Environmental Monitoring Program's "Don't dump chemicals down drain" stickers and wastewater program brochure will be given to the Hazardous Material Management Program staff for distribution during their reconciliation activities.	This was done for the 2006 reconciliation activities.

8.2 Line Performance Assessment

The Program Line Implementation Assessment is an annual effort to determine how well the line or site is implementing the requirements of the program or supporting specific program-related objectives/targets. The success or failure of the line or site to implement program requirements can be attributed to many things: culture, line management support, communications, program management, etc. (Note: Poor program implementation by the line may not necessarily indicate poor program management or execution, but the Program Lead will consider whether these are contributing factors and take appropriate action.)

Significant line violations to program requirements that are discovered during this assessment are entered into the ES&H Self Assessment database for communications and tracking. The assessment is for the "big picture" and not just conducted to find violations. The completed finding form is submitted to the Division 8000 ES&H coordinator for entry into the self-assessment tracking system.

In conducting these assessments the Program Lead makes every effort to align with the scheduled Line Self Assessments conducted by the ES&H Coordinators. This minimizes the disruption to the line and gains the manager's attention.

Stormwater and wastewater assessments were performed during 2006. The results of these assessments are as follows:

- Approximately 10,000 – 20,000 gallons of potable water was released on July 21, 2006 when a six-inch fire sprinkler connection broke. The release of water was controlled approximately 20 minutes after the break. The water did enter the storm drain system. .
- Program staff found an unidentified clay pipe discharging to the Arroyo. Testing confirmed a storm drain at the bottom of an unused driveway at Building 968 discharged to the pipe. The storm drain system map will be updated.
- An annual assessment of material storage on-site. No issues concerning hazardous material storage were found. .

8.3 Environmental Programs Representative Assessment

The Environmental Programs Representative performs and records informal assessments of line implementation of critical program elements. During 2006, the Environmental Programs Representative reported on the results of these informal assessments. No issues requiring action by the Environmental Monitoring Program were identified.

8.4 Corporate Line Self Assessment

No issues were forwarded to the Environmental Monitoring Program from the Corporate Line Self Assessment Program during 2006.

9. Accomplishments

In the past year accomplishments for the Environmental Monitoring Program include:

- One satellite sewer automatic sampler is operating on solar power.
- Flow monitors were installed at the influent and outfall of the Arroyo Seco onsite.
- Installed new level probes at 916, 941 & 968 LECS.
- Fully integrated construction site inspections into Technologist's routine work load.

10. Trends

10.1. Stormwater

The stormwater program started in the early 1990s as part of the National Pollutant Discharge Elimination System (NPDES) program, which had previously addressed point sources of pollutants. Phase I of the program began by addressing stormwater discharges from medium and large municipal separate storm sewer systems (MS4s), industrial activities and construction activities disturbing 5 acres or more. Most recently Phase II of the program began. Phase II addresses stormwater discharges from small MS4s, construction activities disturbing 1 acre or more and additional industrial activities. As the stormwater program has developed and matured the requirements and regulations have become stricter and encompass more areas.

SNL/CA is identified as a non-traditional small MS4 and may be notified in the near future to meet the requirements of the Small MS4 General Permit. The Small MS4 General Permit covers areas such as public participation, public education, construction activities, post-construction, illicit connection and discharge program and municipal maintenance activities. Previously the site was only required to address the areas of industrial activities and construction. This new permit will require the site's stormwater program to expand into other areas.

Stormwater post construction requirements are becoming an integral part of stormwater requirements and regulations. Phase I municipal permits (including Alameda County) now include very prescriptive requirements for stormwater controls on new and redevelopment projects. Stormwater controls may include both stormwater treatment requirements and

stormwater flow control requirements. Some post construction requirements are contained in Phase II small MS4s general permit and the construction activities general permit. As the Phase II program matures requirements may become as prescriptive and strict as the current Phase I requirements. The Phase II regulations will require more support from the site maintenance program in terms of a formal storm drain maintenance and cleaning program. This program was implemented during 2005. The new regulations will also require the Environmental Monitoring Program to work closely with the Facilities Engineering Department to assure that new or significantly remodeled buildings meet the requirements for post-construction runoff control.

The new draft industrial activities stormwater general permit currently has stricter requirements including comparing stormwater sampling results to numeric EPA benchmarks. Exceedence of the numeric benchmarks will trigger activities, evaluation and regulatory notification. There are also more requirements for inspections and sampling. Increased monitoring and sampling requirements will impact program manpower and resources. The California State Water Resources Control Board has established a committee to investigate the appropriateness of the use of numeric benchmarks in the Permit. This investigation has taken more than two years to complete. The final report has been issued, but the SWRCB has yet to take action.

There is an administrative draft Phase I MS4 permit by the Los Angeles Region RWQCB that includes municipal Action Levels for selected pollutants that are applied to stormwater discharges at the end of pipe. This draft permit shows a potential trend moving from regulating stormwater discharges by BMPs to regulating through numeric limitations.

The stormwater program in California has been under increased regulatory oversight. The U.S. EPA hired a consultant to perform audits on all Phase I MS4 stormwater programs and industrial sites under the general permit. The consultant has already performed over 1,000 industrial stormwater audits in the San Francisco Bay area. SNL/California may reasonably anticipate being audited in the near future.

10.2. Wastewater

Section 303(d) of the federal Clean Water Act requires that states identify water bodies that do not meet water quality standards. The San Francisco Bay RWQCB has identified the following water bodies and pollutants for which the Arroyo Seco is a tributary and the site's treated wastewater is discharged to:

- Several of the Arroyos that Arroyo Seco is tributary to are listed for diazinon
- Alameda Creek is listed for diazinon
- San Francisco Bay is listed for chlordane, DDT, diazinon, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, PCBs (dioxin like), and selenium.

This list was approved by the SWRCB and partially approved by EPA in 2006. The RWQCB is required to address these issues through Total Maximum Daily Loads (TMDLs). TMDLs examine these water quality problems, identify sources of pollutants, and specify actions that create solutions. The RWQCB are currently working on TMDL reports and implementation plans for the pollutants of concern listed above. The final TMDL reports and implementation plans may directly affect Bay Area wastewater treatment plants' Pretreatment and Pollution

Prevention programs. New requirements or regulations for LWRP's Pretreatment and Pollution Prevention Program may lead to stricter requirements or scrutiny for SNL/CA through their wastewater discharge permit. TMDL reports and implementation plans may also require additional requirements for area stormwater programs, for example, if TMDL limits are imposed, SNL/CA may need to develop the capability of measuring stormwater loads which would include flow quantities and concentrations. Stream Flow meters have been purchased and installed in the Arroyo Seco where it enters the developed portion of the site, and where it exits the site.

10.3. Above-ground Tanks

Program staff updated the site's Spill Prevention Control and Countermeasure (SPCC) Plan to meet new federal regulations. The federal regulations, and the site's SPCC Plan, require tank integrity testing for all above ground fuel tanks regulated under 40CFR112. The tank integrity testing is a new program requirement and will require additional funding to have a qualified contractor perform the testing on all of the appropriate tanks onsite. The requirements have been communicated to Management of the Facilities Maintenance Organization, which has the responsibility for integrity of the tanks. The Facilities Maintenance Organization is currently assessing whether to have the work performed by an outside company, or to acquire the necessary expertise and equipment within Sandia/CA. Funding for this requirement is also being sought.

10.4. Underground Tanks

During 2005, a decision was made by SNL/CA Management to investigate removal of the one Underground Storage Tank on-site. Preliminary engineering was performed in preparation for issuing a Request for Proposal for the tank removal. This process was halted in 2006 due to budget restraints.

11. Goals and Objectives

EMS environmental objectives for the Environmental Monitoring Program are:

- Reduce sewer water quantity.
- Improve sewer water quality.
- Reduce volume and velocity of stormwater runoff.
- Keep pollutants out of stormwater.

The EMS includes implementation of a watershed approach for surface water protection. The watershed approach is meant to have a geographic focus on the natural boundaries of a watershed, which may transcend departmental, programmatic and organizational boundaries of the site, using sound science. Many of the objectives and targets of the Environmental Monitoring Program support a watershed approach. The SNL/CA site lies within a single watershed. The site's stormwater runoff drains to the Arroyo Seco. The Environmental Monitoring Program has broken down this watershed into subwatersheds referred to as drainage areas in the previous discussions. The Environmental Monitoring Program works with

departments and personnel across the site on all levels to ensure protection of the Arroyo Seco water quality.

Environmental Monitoring Program goals and objectives for the next 1-3 years are:

- Incorporate new requirements when the Industrial Activities Stormwater General Permit is reissued. The draft revised permit currently has more visual inspection requirements, more sampling requirements, more stringent analysis of sample results and follow-up actions, and specific BMP requirements.
- Continue to implement Phase II Small MS4 Stormwater General Permit requirements in the Industrial Activities SWPPP.
- Obtain funding for SPCC tank integrity inspections.
- Increase integration of BMPs into new facilities projects.
- Receive ten year permit from the Army Corp of Engineers.

Previous goals and objectives that have been met are:

- Replace LECS tanks and upgrade LECS systems.
- Obtain regulatory approval of the Arroyo Management Plan.
- Complete the silver source investigation at the MANTL.
- Improve environmental database system reliability (e.g. improving current database or working with SNL/NM to merge into their database)

12. Appendix A Personnel Assignments

Environmental Monitoring Personnel Assignments

Job Title	Personnel	Back-Up
Environmental Monitoring Program Lead	Robert Holland	Mark Brynildson
Environmental Management Technologist	John Chavarria	None
Environmental Monitoring Contract Engineer(s)	Kristin Kerr	None

Special Assignment Personnel

Job Title	Personnel
Underground Storage Tank Operator	Carl Smith

13. Appendix B Environmental Monitoring Program Risk Assessment (January 2007)

Environmental Monitoring Program Risk Assessment (January 2007)

The risk assessment process for the Environmental Monitoring Program follows the general steps of

1. Identify the risk
2. Identify the probability of the event occurring
3. Identify the consequence if the event occurs.

The following tables will be used to assign a numeric value to the probabilities and consequence categories.

Likelihood/Probability Of Occurrence Level	Likelihood/Probability Criteria
Very High	• Everything points to this occurring
High	• <i>High chance</i> • <i>Lack of relevant processes or experience contribute to a high chance of occurrence</i>
Medium	• <i>Even chance</i>
Low	• <i>Not much of a chance</i>
Negligible	• Negligible chance this will occur

CONSEQUENCE/ SEVERITY LEVEL	CONSEQUENCE/SEVERITY CRITERIA
High	<p>damage (e.g., ozone depletion, rad soil contamination) • Serious environmental impact resulting in recovery actions lasting 5 years or more (e.g., TCE in aquifer) • Results in General Emergency (affects both onsite and offsite) • Unsatisfactory rating by external regulators or cease and desist order • Affects lab leadership, including prime contract • Actions, inactions or events that pose the most serious threats to national security interests and/or critical DOE assets, create serious security situations, or could result in deaths in the workforce or general public (i.e., IMI-1) † • Actions, inactions or events that pose threats to national security interests and/or critical DOE assets or that potentially create dangerous situations (i.e., IMI-2) † • Unallowable costs or fines >\$1M • Adverse public opinion – high interest/widespread open public attention or debate (lasting weeks to months) • Customer dissatisfaction results in permanent loss of lab customer • Catastrophic failure to meet internal requirements • Loss of major program within the division (>\$10M)</p>

Medium	<ul style="list-style-type: none"> • Has the potential for adverse impact on Sandia's programmatic performance or the achievement of corporate strategic or operational objectives • Significant injury/illness -fully recoverable with a long recovery time • Significant environmental impact resulting in recovery actions lasting up to 5 years (e.g., major oil spill) • Results in Site/Area Emergency (affects multiple onsite facilities) • One of regulator "hot buttons" (e.g., NNSA, NMED) • Results in increased oversight of limited number of functions • Actions, inactions, or events that pose threats to DOE security interests or that potentially degrade the overall effectiveness of DOE's safeguards and security protection program (i.e., IMI-3) † • Unallowable costs or fines >\$500K and <\$1M • Adverse public opinion – moderate interest, limited PR problems of short duration (days) • Customer dissatisfaction results in partial loss of program • Significant failure to meet internal requirements • Loss of program within division (>\$1M)
Low	<ul style="list-style-type: none"> • Minimal injury/illness – Fully recoverable with a short recovery time • Minimal environmental impact that can be improved within days • Results in increased short-term oversight • Results in an Operational Emergency (affects a single onsite facility) • Actions, inactions, or events that could pose threats to DOE by adversely impacting the ability of organizations to protect DOE safeguards and security interests (i.e., IMI-4) † • Unallowable costs or fines <\$500K • Adverse public opinion with short-term local negative publicity or embarrassment
Negligible	<ul style="list-style-type: none"> • Little or no attention, might be discussed as lesson learned

The risk level will be graded according to the following matrix. Adapted from DOE O 471.4.

RISK GRADING LEVELS					
		Consequence/Severity			
		<i>Negligible</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>
Likelihood of Occurrence	<i>Very High</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>	<i>High</i>
	<i>High</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>	<i>High</i>
	<i>Medium</i>	<i>Low</i>	<i>Medium</i>	<i>Medium</i>	<i>High</i>
	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Medium</i>
	<i>Negligible</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>

Risks Associated with the Environmental Monitoring Program

- 1. Release of hazardous material to the sanitary sewer, storm sewer system, or the ground.**
 - a. Intentional**
 - b. Accidental**
 - c. Discovery of past release**
- 2. Reduction in Program Funding of 10%**
 - a. Training**
 - b. Satellite Sewer Monitoring**
 - c. LECS Operations**
 - d. Contract Support**

1. Identification of Risk

The primary route for a pollutant to enter the environment that would be of concern to the Environmental Monitoring Program is through a release of a pollutant in liquid form to the wastewater system, the stormwater system, or to the ground. Such a release could constitute a violation of wastewater or stormwater discharge permits held by SNL/CA, or could constitute a violation of federal, state, or local laws or regulations. In this Risk Analysis, two risks will be considered: risk from intentional release (discharge) of pollutants, and unintentional release. The risk from discovering a past release will also be discussed.

a. Intentional Release

The intentional release scenario covers both the intentional release due to ignorance of regulations or best practices prohibiting such releases, and the willful discharge of pollutants even if such prohibitions are known.

1. Probability

SNL/CA takes great pains to educate the workforce about their responsibilities concerning environmental protection. This done through new-hire orientation, required training for generators of hazardous waste, and communications efforts by the Environmental Management Department. This training serves to minimize the probability of a release due to ignorance of the rules. SNL/CA also makes it clear to employees during new hire orientation that compliance with all environmental laws and regulations is expected and required. This serves to minimize the risk of willful discharges.

The likelihood of an intentional discharge of a hazardous material is considered **Negligible**.

2. Consequence

The consequence of an intentional release can range from a simple audit finding to a revocation of SNL/CA's sanitary sewer discharge permit. The cost to SNL/CA of an audit finding is minimal, requiring program personnel to develop and implement corrective actions. The cost to SNL/CA of the revocation of the sanitary sewer discharge permit would be significant since most site operations would have to cease or be curtailed while the condition that resulted in the revocation of the permit was corrected. The consequence is considered to be **High**.

3. Overall Risk Category

In accordance with the chart above, for a risk with a probability of Negligible with a High severity, the risk category is **Low**.

b. Accidental Release

The accidental release scenario covers releases of hazardous materials due to spills and natural phenomena (e.g. earthquakes, fire, storm).

1. Probability

SNL/CA has over 40,000 containers of hazardous materials on-site (according to the Chemical Information System). All effort are made to minimize the chance of accidental spills, such as requiring that all chemical containers greater than 1 liter be stored within secondary containment, site inspections for inappropriate storage of chemicals outdoors, etc. Given this large number of containers and the complexity of site operations, the probability of an accidental spill or release is considered to be **Very High**.

2. Consequence

The actions taken above to minimize the probability of an accidental release (secondary containment, etc.) also serve to minimize the consequence of an accidental release. In general, the largest chemical containers on site can be categorized:

- Large storage tanks for cryogenic liquids
- Large storage tanks for liquid fuels
- Other chemicals (largest container 55 gallon drum)

A cryogenic liquid release would not have a lasting effect on the environment due to rapid volatilization.

Compressed gases are also not considered here since they would have negligible or no impact to the sanitary sewer, storm sewer, or groundwater.

The liquid fuel storage tanks all have built-in secondary containment. These tanks are checked on a frequent, routine basis, so the potential for a large leak is minimal.

Other chemicals are required to be kept within secondary containment if the quantity exceeds one liter. Compliance with this requirement is verified by the Division 8000 Self-Assessment process, and also by the Environmental Monitoring Program's annual site inspection. The largest single chemical container is a 55-gallon drum.

Given the above conditions, the consequence of the worst credible spill is considered to be **Low**, requiring minor environmental cleanup.

3. Overall Risk Category

The overall risk category, given a probability of **Very High** and a consequence of **Low** is **Medium**.

c. Discovery of a Past Release

Routine operations, such as construction of new buildings, or demolition of old buildings may uncover previously unknown areas of contamination.

1. Probability

During the 1980's, DOE undertook a comprehensive investigation of environmental releases at SNL/CA. The investigation included examination of aerial photographs, examination of records, and interviews with long-term and retired employees.

Where it was determined that there was the potential for past releases to the environment, investigatory sampling was performed.

These initial investigations led to the state of California designating 23 Solid Waste management Units (SWMUs) at SNL/CA. The State required that corrective action be undertaken at three of these locations. At two of these locations, the Navy Landfill, and the Trudell Auto Repair Shop, remedial actions have been completed. At the third site, the Fuel Oil Spill, the State determined that no further action was necessary, and the site is now in long-term monitoring.

SWMU #10, the former Building 913 was investigated after Building 913 was removed. Sampling showed no contamination, and this SWMU was closed by the State.

Given the extensive nature of the previous investigations, the likelihood of finding a previously unknown area of contamination is considered to be **Negligible**.

2. Consequence

If a previously unknown area of contamination was discovered, it would require SNL/CA to increase funding to the Environmental Monitoring Program in order to remediate the problem. Such a remediation program can last many years, and funding can run into the tens of millions of dollars for major contamination. Therefore the consequence is considered to be **Medium**.

3. Overall Risk Category

Given a probability of **Negligible** and a consequence of **Medium**, the risk category is **Low**.

2. Identification of Risk

Future declining budgets may require modifications to Environmental Monitoring Program operations. Operations required by regulations will not be altered. Consideration will be given to alterations in the proactive aspects of the program. The following are actions that could be taken by the Environmental Monitoring Program in response to a 10% reduction in budget.

a. Reduce Training

All training not required by Sandia Corporation or by regulation would be curtailed. Savings would result from avoidance of the cost of external classes/conferences and associated travel. Risks associated with this action would be that a new requirement or regulation would be instituted without the knowledge of Program personnel, leaving Sandia open to enforcement action or fines.

1. Probability

External classes and conferences are only one method utilized by Program personnel to keep informed of regulatory changes. The probability is considered to be **Low**.

2. Consequence

Noncompliance with a new requirement or regulation could result in fines being assessed against Sandia. Environmental fines frequently amount to tens to hundreds of thousands of dollars, therefore the consequence is considered to be **Medium**.

3. Overall Risk Category

Given a probability of **Low** and a consequence of **Medium**, the risk category is **Low**.

b. Satellite Sewer Monitoring

Discontinue the satellite sewer monitoring program. This program is not required by regulation. Savings would be approximately \$3500.00 in analytical costs, and approximately three hours per week of technician time.

1. Probability

The satellite sewer monitoring program mainly serves to help in identifying the source of a metal exceedance when it occurs. The probability is considered to be **Low**.

2. Consequence

In ability to determine the cause of an exceedance decreases SNL/CA's credibility with the regulator. Over the years, we have established a reputation with the regulator as a conscientious discharger. The risk of losing this level of trust with the regulator is considered to be **Low**.

3. Overall Risk Category

Given a probability of **Low** and a consequence of **Low**, the risk category is **Low**.

c. LECS Operation

Discontinue the Liquid Effluent Containment System (LECS) program. This program is not required by regulation. Savings would be potentially \$20,000.00 per year in analytical costs, and approximately three hours per day of technician time. Costs would be incurred to modify the plumbing at MANTL, B916, CRDL, and CRF to bypass the LECS.

1. Probability

The LECS program mainly serves to as a way to verify that effluents from high-risk operations are checked before they are discharged to the sanitary sewer. Before the LECS were installed, SNL/CA had one instance of discharging a sufficient quantity of metals to impact operations at the Livermore Water Reclamation Plant. During 2006, there were several cases of the contents of a LECS tank exceeding discharge limits. Without the LECS in place, SNL/CA could have exceeded the discharge limits on each of these occasions. The probability is considered to be **High**.

2. Consequence

An increase in the number of exceedances from SNL/CA would likely damage the trust built up over the last several years. A pattern of exceedances could likely lead to fines being imposed. The risk is considered to be **Medium**.

3. Overall Risk Category

Given a probability of **High** and a consequence of **Medium**, the risk category is **High**.

d. Contract Support

Eliminate contract support for the Environmental Monitoring Program. Contractors currently prepare many of the documents required by the Environmental Monitoring Program, including permit renewal applications, and annual reports top regulatory agencies. Contract support personnel are also vital in keeping abreast of new and changed regulations.

1. Probability

The increased regulatory risk from loss of contract personnel would be low, but the probability of not meeting targets and objectives would be **Medium**.

2. Consequence

Loss of contract personnel would severely impact the Program's ability to set and meet progressive Objectives and Targets. These Targets and Objectives are a requirement for maintaining ISO certification. The risk is considered to be **Medium**.

3. Overall Risk Category

Given a probability of **Medium** and a consequence of **Medium**, the risk category is **Medium**.

14. Appendix C Environmental Monitoring Program Self-Assessment Summary Report

June 20, 2006

Program Area: Sanitary Sewer Outfall and Satellite Sampling Equipment

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Environment, Safety, and Health Assessment Report

Environmental Monitoring Program Self-Assessment Summary Report

June 20, 2006

Program Area: Sanitary Sewer Outfall and Satellite Sampling Equipment

Submitted by:

Robert Holland, Lead Assessor
Environmental Monitoring Program Lead

Date

Approved by:

Gary Shamber, Manager
Environmental Management Department

Date

Distribution

Gary Shamber, Department Manager, 8516
Ed Cull, ES&H Manager
Pat Smith, 8500 Director
Records Center EM-219 Program Management Records

Summary of Results

The Environmental Monitoring Program staff assessed the sanitary sewer outfall and satellite sampling equipment as an element of the Program's wastewater activities. The assessment demonstrated equipment documentation was available and accurate (except an operating procedure specifically for the satellite sewer automatic samplers) and equipment was functioning properly with adequate inspections.

The daily inspection and maintenance of the outfall equipment and backup equipment available ensures any event that leads to noncompliance with permit monitoring requirements due to equipment failure is quickly corrected.

The Program's web page was recently revised with a link for the SPCC online training.

There were no findings or Corrective Action Plans identified in this assessment. The Environmental Monitoring Program staff will create an operating procedure for the satellite sewer automatic samplers. An investment opportunity identified is to install solar panels on the second satellite sewer sampler if the first installation is successful.

Assessment Result Details

Scope

Environmental Monitoring Program staff assessed the sanitary sewer outfall and satellite sampling equipment as an element of the Program's wastewater activities. The goal of this assessment was for continuous improvement in the Program area and to assess the reliability of outfall equipment, which is required by the Wastewater Discharge Permit, and satellite sampling equipment, which is implemented as a best management practice. Staff would also take this opportunity to identify repair items, priorities and resulting investment opportunities.

The assessment included the physical condition of the equipment and verifying that operating procedures and equipment manuals are up to date and available. The assessment also reviewed supporting procedures. For example, using the ES&H Nonconformance Reporting procedure for outfall equipment or sampling issues provides a well established method of documentation for potential compliance issues with the regulatory agency.

A line implementation aspect is included in the assessment by choosing a subset population of line activities to review for potential impacts to wastewater. Maintenance activities, specifically those related to cooling tower discharges and wash pad discharges, were chosen. In addition, Line Performance Assessments done in conjunction with Division 8000 Self Assessments were also reviewed.

In addition Program Staff conducted a Programmatic Document Review as required in the *Quality Assurance of Data, Documents and Select Activities of the Environmental, Safety and Health Departments, 8516 and 8517* report. The Programmatic Document Review Form is attached. These documents are related to maintaining regulatory compliance and will be reviewed annually with every self assessment program area.

Methodology

Program staff reviewed

- the equipment condition of the outfall, controls and monitoring equipment;
- the equipment condition of the satellite sewer automatic samplers;
- related documents such as operating procedures, logs and manuals;
- supporting procedures for work orders, calibration and supporting equipment; and
- Division 8000 Performance Assessment documentation.

This review was conducted through personnel interviews, outfall facility inspections and document review.

Items in Compliance

The following operating procedures were found to be up to date, accurate and available:

- Sanitary Sewer Outfall Monitoring Operating Procedure OP471410
- Cooling Tower Cleaning Operating Procedure OP471599

The equipment manuals for the pH probes, level indicators, chart recorders, automatic samplers and solar panels are in Building 922 Room 105 on the Environmental Operations Technician's book shelf. Copies of manuals, when multiple copies are available, are in the records center (EM-211 Equipment History). The data logger equipment manual is in Building 922 Room 106 on the Environmental Monitoring Program Lead's bookshelf.

The following describes the outfall equipment condition:

- The outfall was constructed in 1992 and the flume was redesigned in 1997
- The outfall trailer was installed in the late summer of 2001.
- The refrigerated automatic samplers (ISCO 3700 series) were purchased in 2002. There are 2 samplers in operation in the outfall trailer. There are 3 backup controllers for the 3700 sampler (daily sampler) and 2 backup controllers for the 3710 sampler (weekly sampler).
- pH monitoring equipment and level indicator are old, however, the sensors are checked by a contractor during quarterly calibration activities and changed

routinely, as needed. A backup for the pH monitoring equipment is a hand held pH probe that would be used twice a day to monitor the discharge.

- The circular charts (Honeywell) were replaced in 2001. These are checked daily by the Environmental Management Technician. The calibration contractor repairs or replaces chart recorders as needed.
- The suction line (sample tubing) runs from the trailer to the outfall building and has not been replaced since the trailer was installed. If this tubing needs replacement the Maintenance Department will need to replace the line.
- The pump tubing is replaced by the Environmental Management Technician every 3 months or upon failure.
- There is no preventative maintenance schedule for the ventilation system at the outfall because the vent is too high. The operating procedure does require the door to be propped open, as well as having the ventilation system on.
- The data logger collects flow rate, total flow and pH from the outfall monitoring equipment. The data logger can be accessed via the SRN. The data logger is a backup system for the circular chart records. It is currently not operational but is expected to be back on-line soon.

The following describes the satellite sewer equipment condition:

- There are 4 automatic samplers ISCO 6700 series. Two were purchased in 1995 and 2 were purchased in 2003. There are 2 samplers currently in operation. They are located at 911 NE sanitary sewer line and MANTL NW #3 sanitary sewer line.
- There are 4 marine batteries to power the samplers. The batteries are recharged every 3 weeks. These batteries need to be replaced frequently, every 1-2 years.
- There are 4 portable manhole covers for use with the satellite sewer samplers. These manhole covers are lighter than standard manhole covers and have a hole for sampler tubing.
- The pump tubing is replaced every 2 months and the suction line (sample tubing) is replaced as needed.
- There are 10 solar panels available for use with the samplers. Four of the panels are older (purchased for the stormwater automatic samplers but not used) and 6 panels are new. A maintenance work order was recently approved to mount 2 panels to each satellite sampler.
- Nickel/cadmium batteries need to be used with the solar panels. There are 5 nickel/cadmium batteries available.

Maintenance Department has a new on-line tracking system for work order requests. This will make tracking of outstanding work orders and equipment repairs easy for the Environmental Monitoring Program. Issues with the outfall monitoring equipment are also tracked by the Environmental Monitoring Program Nonconformance Reporting system because the equipment is necessary for compliance with the Wastewater Discharge Permit. Equipment repairs related to the samplers are sent to ISCO (e.g. to refurbish controllers).

Quarterly Certification Reports from the calibration contractor are kept in Building 922 Room 105 for a year or more and then filed in the records center (EM-211 Equipment History).

The Environmental Monitoring Program Lead participated in a Line Self Assessment on April 3, 2006 in equipment rooms in Building 904, 905 and 912. There were no findings. The Program Lead's goal is to coordinate with Line Self Assessments at least quarterly.

Strengths

There is adequate backup equipment for the compliance monitoring point at the outfall.

There is daily monitoring and maintenance at the both the outfall building (cleaning the pH probe, level indicator and flume), trailer (checking the sample collection, chart recorders and digital readouts) and office data logger when operational (checking flow and pH readings). This ensures any problems or issues will be discovered quickly.

Observations/Recommendations

There is no operating procedure for the satellite sewer samplers. These are temporary installations but a procedure should be developed for general operation at any location.

The Environmental Management Technician believes the fume hood located in the outfall trailer may not be adequate for certain uses. The IH Program has been contacted. The Technician will work with IH staff to determine if different or additional equipment is needed.

The Maintenance Department's cooling tower cleaning operating procedure includes reference to using the new Batch Treatment System at Building 916. However, there is no operating procedure for the Batch Treatment System. Environmental Monitoring staff will offer assistance to the Maintenance Department to develop an operating procedure for this piece of equipment. There is no operating procedure for the Wash Pad including determining appropriate cleaning/maintenance schedule. Environmental Monitoring staff will offer assistance to the Maintenance Department to develop an operating procedure for this operation.

The Environmental Monitoring Program will investigate collaborative opportunities with the Hazardous Materials Management Program during their annual chemical inventory reconciliation program. The "Don't dump chemicals down drain" stickers and wastewater program brochure will be given to the HMM Program staff for distribution during their reconciliation activities. They will be asked to provide a sticker and brochure to any laboratory that does not have the sticker prominently placed by their sinks.

Investment Opportunities

A higher quality automatic pipet to preserve samples at the laboratory and outfall would provide more accurate dispensing of correct preservative volumes and less unintentional dripping, which can be a safety issue.

Findings

There were no findings in this self-assessment.

Personnel Interviewed

Robert Holland
John Chavarria
Kristin Kerr

Appendices

Appendix 1. Assessment Team

Robert Holland,
John Chavarria,
Kristin Kerr

Appendix 2. Schedule

02/21/06 kick-off meeting

04/25/06 operating procedure review

05/09/06, 05/16/06, 06/02/06 interviews and document review

06/06/06 interviews

06/20/06 closing meeting

Appendix 3. Checklists

Environmental Monitoring Program Self Assessment

Program Element: Sanitary Sewer Outfall and Satellite Sampling Equipment

Staff involved: Robert Holland, John Chavarria, Kristin Kerr, Den Thap

Date(s):

Hours spent doing the assessment:

1. Related documents for review (up to date, accurate and available)

Document	Reviewed (date)	Comments, improvements, findings, etc.
Sanitary sewer outfall monitoring operating procedure		
Equipment Manuals – pH, level indicator, automatic samplers, chart recorders, data logger		
Cooling tower cleaning operating procedure		
Treatment system operating procedure		
Wash Down Pad Operating Procedure		

2. Equipment condition (approximate age, condition, functionality, adequacy, backups)

Equipment	Inspected (date)	Comments, condition, findings, etc.
<i>Outfall</i>		
Flume		
pH probe		
Level/flow meter probe		
Automatic sampler (weekly composite)		
chart(s)		
trailer		
Outfall building		
Automatic sampler (daily composite)		

<i>911 NE Satellite Sewer Sampler</i>		
Automatic sampler		
Battery		
Solar panels		
Manhole covers		
<i>MANTL NW #3 Satellite Sewer Sampler</i>		
Automatic sampler		
Battery		
Solar panels		
Manhole covers		
<i>Storage/Backups</i>		
Batteries in storage		
Automatic samplers in storage		

3. Supporting procedures (work orders, replace vs repair, calibration, supporting equipment needed)

Supporting Procedure	Reviewed (date)	Comments, improvements, findings, etc.
Maintenance		
Work Orders tracking		
Calibration schedule/tracking		

4. Line Implementation

Activity	Review
Cooling tower discharges: - Cooling tower cleaning operating procedure - Treatment system operating procedure	
Wash pad discharges: - Operating procedure	
Line Performance Assessments done in conjunction with Line Self Assessments (by Terry Gardner)	
“Don’t dump chemicals down drain” stickers	

Finding(s)

Corrective Action

PROGRAMMATIC DOCUMENT REVIEW FORM

Document Type	Document Title	Review Complete / Date	Changes Made	Comments
Operating Procedure	Sanitary Sewer Outfall Monitoring (OP471410)	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	due for update 12/07; need to change EOD to EMD
	Incident Reporting (OP471608)	<input checked="" type="checkbox"/> 06/06/06	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Updated in June 2006
	Categorical Process Monitoring (OP471409)	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Due for update 4/07; update before due date, after 910 LECS is taken off-line; need to change EOD to EMD
PHS	SNL8A00186-010 Environmental Monitoring	<input checked="" type="checkbox"/> 4/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Current version (Version F); expires 12/06
Other Program Documents	Environmental Program Description	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Updated February 2006
	Stormwater Pollution Prevention Plan for Construction Activities	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	no longer required; Notice Of Termination (NOT) filed in June 2005
	Stormwater Pollution Prevention Plan (Industrial + MS4)	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	minor revisions identified; will make all needed changes before the beginning of the next wet season, by September 2006
Web Pages	Program General Web Page	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	Stormwater Web Page	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	Sanitary Sewer Web Page	<input checked="" type="checkbox"/> 04/25/06	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	SPCC Training Page	<input checked="" type="checkbox"/> 06/07/06	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Updated link to on-line training identified as ENV203A to ENV203CA

Organization: 8516

Program: Environmental Monitoring

Date: _____

Signature: _____
Program Lead